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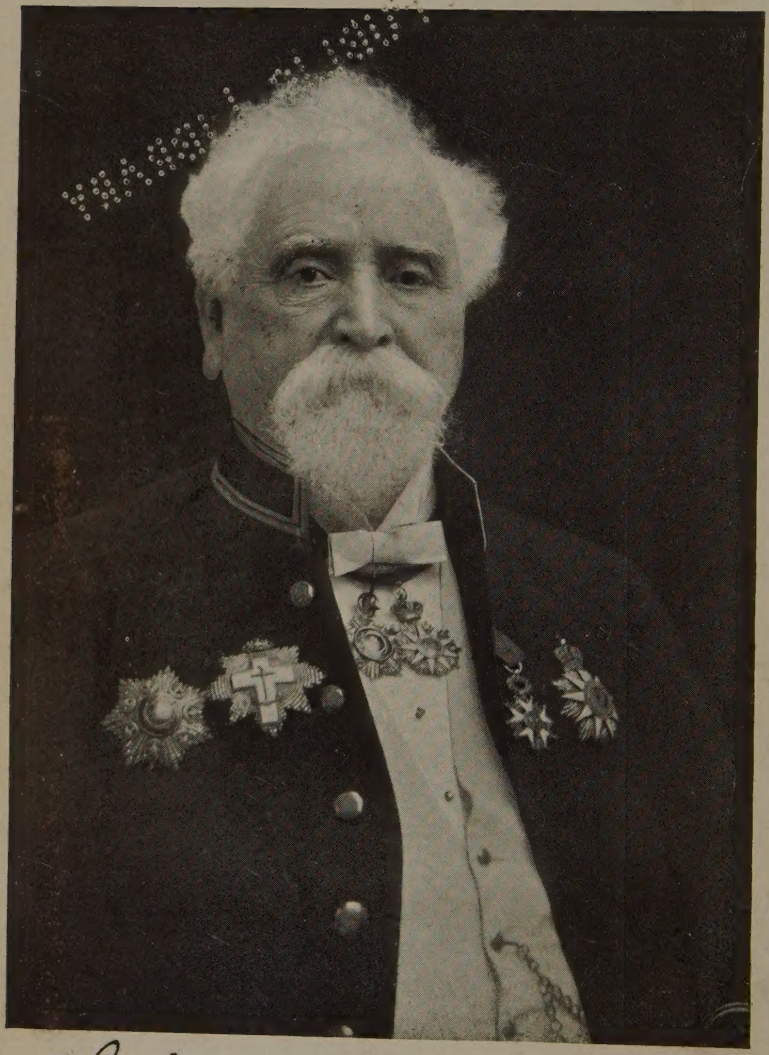

Hiram S. Maxim

MY LIFE

BY

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WITH 11 TEXT ILLUSTRATIONS AND 16 PLATES

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MY LIFE

CHAPTER I

WHEN we are called upon to give evidence in a Court of Justice we are required to swear in some conventional form that we will tell the truth, *the whole truth*, and nothing but the truth; it is then the business of the lawyers to see to it that we do not tell *the whole truth*. I shall have to observe the same rule in preparing this little account of the events of my life. I shall tell the truth and nothing but the truth as far as I go, but it would not be advisable for me to tell the whole truth, as it might entangle me in numerous lawsuits which I wish to avoid.

The ancestors of the Maxim family were French Huguenots. They were driven out of France and settled in Canterbury, England, from which place they emigrated to Plymouth County, Massachusetts, where "they could worship God according to the dictates of their own conscience and prevent others from doing the same." My great-grandfather lived at Wareham, Massachusetts, where my grandfather was born. He married a large and very strong young woman by the name of Eliza Rider—who was also a descendant of the very early English settlers—and with another member of the Maxim family, they emigrated to the district of Maine, which was not then a State, and took possession of a tract of land on the shores of Androscoggin

Lake in full view of the White Mountains. At that time there were no roads in that part of the country, and the little party had to find their way through the primeval forest as best they could. My grandfather built a house and outbuildings, cleared the land for a farm, and managed in some way to get cattle, sheep, and pigs from Massachusetts. When we consider the length and severity of the winters, it is certainly very difficult to understand how they managed to exist so far away from civilization.

There never were many Red Indians in that part of the country, and the few that did exist were of a comparatively harmless variety. There were, however, plenty of black bears, which were easily captured in traps or killed with firearms. The skins of these animals sold for ready cash, and the flesh was a regular article of diet; moreover, there was a premium paid for every bear killed.

My grandfather had seven children, my father—Isaac Weston Maxim—being the youngest. The middle child of the family was Eliza, who, like her mother, was a physical giantess, and also very intellectual. For many years there has been a tradition that there was always one very strong member in the Maxim family, and I think I am entitled to be recognized as the strong member of the generation in which I was born. I have a nephew who is in a fair way to continue the line of strong men and women.

My father was 5 feet 8 inches in height and weighed 182 lbs. (13 stone). When a young man he assisted on his father's farm; later on, he went to Massachusetts, where he earned a little money, returned to Maine, and married Harriet Boston Stevens. Together they went to Sangerville, Maine, cleared a farm, erected buildings, and started farming.

This little farm was completely surrounded by a dense

forest. Not a house was in sight, but we had one neighbour about half a mile away, while my uncle, Captain Samuel Maxim, had a farm one mile from ours. In those early days the bears had not learned to fear mankind so much as they did later on, and did not hesitate to come out into the clearing. When about five years of age I remember seeing a black bear chasing our sheep early in the spring. My mother's screams stopped the bear ; my father ran for his gun, but before he could get out of the house the bear was very near the woods and my father said : " There, Harriet, if you had not screamed I could have killed that bear."

There have been several epidemics of Millerites in the State of Maine, sometimes called " Second Advents " or " World Burners." On one occasion, having ascertained, by diligent search in the Bible, the exact day, hour, and minute that the world would come to an end, the " saints " disposed of their property. Some failed to plant their crops, as they had enough to last until the fatal day. When everything was in readiness for the final end of all things, which was fixed for a certain day in February, there was a lot of snow on the ground. Some of the " saints " took great care to have their watches and clocks corrected so as to know the exact minute the final crash would come. The hour fixed was about nine o'clock at night, and most of the women appeared in their ascension robes. The " saints " met at a place called Gillman's Corner, in front of Gillman's little store. Some repairs had recently been made to the roof, and a ladder was still in position. A few minutes before the final send-off, an old and very fat woman climbed up the ladder, got on to the ridge-pole and walked forward to the end of the roof. She stood there with her arms extended and her ascension robes fluttering in the wind like a pair of wings. One of the

"saints" had his watch out and called off the time as it passed, and when the exact minute arrived, the old lady on the roof started to fly. She gave a jump and landed in a big pile of snow which had a decidedly cooling effect, and knocked every particle of superstition out of her. She never had a relapse.

There was no one in the State of Maine that ridiculed this movement with more reason and vigour than my gifted mother. She had a lot of brains in the top and front of her head, and made the best use of them.

When I was only six years of age my father gave up his farm, sold his cattle, and started a wood-turning establishment with two lathes at French's Mills in the same township. Here I commenced my education in the little school-house.

At French's Mills there was said to be a jamb some distance down the river where the debris from the saw mill had formed a dam in the swamp. I was always very anxious to see this jamb, but my mother would never allow me to go into the swamp, saying, "You're only a little boy, anyway, and the bears in the swamp might attack you."

One Sunday, however, I persuaded my father to go down to the jamb with me. We were picking our way between the trees and bushes when I saw a pole, that my father had stepped over without touching, commence to move. I naturally looked at the other end, and, sure enough, there was a big bear. He was walking so softly that my father did not hear him, and when I shouted, "There is a bear," my father would not believe me. I got hold of his coat, however, and pulled him along to the other end of the pole, when he saw the big track in the soft earth. We at once turned about, my father saying, "Let us go to the house and get the gun as quickly as possible; perhaps we may kill him." It was very slow work getting through

the underbrush, and when we got out and into the clearing we saw a man coming out of our house with our gun. We then learned that the bear that we had dislodged had passed very near the little school-house where Sunday-school was in session, and the instant the bear was seen every man ran for a gun. Soon all the men and dogs in the neighbourhood were on the track of the bear; but they didn't get him; they seldom did at that time. The next day it was found that dogs were not quite so numerous as they had been.

The bears, that were so plentiful in Maine at that time, weighed about four hundred pounds each, and I think had the finest fur of any bears in the world. My uncle, Hiram Stevens, after whom I was named, captured a small cub and brought it up as a pet. It would eat almost anything and about as much of it as a pig, soon attaining a considerable size and having very peculiar ways of showing its affection. At that time my uncle was paying his respects to the young lady who afterwards became his wife, and she objected very strongly to the bear. The next Sunday night, therefore, my uncle locked the bear securely in the woodshed, but he had not been very long with his lady-love when the front door was burst in and the bear landed in his lap. This brought matters to a crisis: the young lady delivered her ultimatum—he must either break off the engagement or kill the bear—and so the interesting pet was sacrificed on the altar of Cupid the next day.

Bears do not make safe pets. If you step on a dog's foot, the dog has brains enough to know that it is an accident, and actually expects you to pet and pity him for your blunder, which no doubt you will do. But if you step on a bear's foot, the bear will retaliate by taking about a pound of steak out of the calf of your leg.

As a rule these bears never attack a human being unless

provoked. If one approaches a female with cubs, she will get up on her hind legs, make a great noise and appear very ferocious: but as she approaches very slowly, there is plenty of time to get away.

I had a brother Leander who I think was a natural hunter. I purchased an old double-barrelled shot-gun that had had the muzzle of one of the barrels blown off and the breech injured so that it could not be fired. The other barrel was also injured at the muzzle. I cut off about ten inches of the muzzle and gave it to him; and with this little old gun he would kill more game in a day than the city sportsmen with their beautiful outfits could kill in a week. One day while out hunting he thought he would visit a trap that a neighbour had set for a bear. He found the trap and a bear smelling about it, and it at once occurred to him that he might capture the bear himself. So he approached the bear and fired a charge of bird shot into its face and then ran; and by the time he had reloaded, the bear had stopped turning somersaults and scratching his face and had started off in pursuit. As it approached he gave it another charge full in the face, again running away; but the bear apparently did the same thing, for he was never seen afterwards.

While living at French's Mills I was always collecting sticks and bits of wood, and attempting to build a saw mill over a little stream of water that leaked through the dam. I had a mud dam and a pond with several fish in it that seemed to be quite tame; they were, however, much too large for the pond. Of course, mud and turf played a large part in the erection of my mill, and my clothes got in a very dirty condition, the result being a severe scolding.

One day when dressed in my best clothes, I was told that I should receive a whipping if I returned with them wet

and muddy, but I forgot all about this, and got them very wet by wading too far into the water. I tried to get the water out with sawdust, but it was a failure, so I thought I would lie down in a warm place and allow the sun to dry them. The place selected was on some planks that were laid on the top of the flume. I fell asleep, and waked up *in* the flume. The water was about ten feet deep and the sides smooth and vertical. I remember the sensation perfectly; my eyes were wide open and I could see the sunbeams coming down and making streaks in the water. The fish came very near to me, some of them taking my fingers in their mouths. I then appreciated that I was drowning, and flopped about and tried to swim. I raised my head above water several times and got a breath of air, but soon I began to sink. Suddenly my hand came in contact with a long plug that projected about three inches inside the flume, having been driven in to stop a hole, and by holding on to this I was able to keep my head above the water, although the plug itself was below the water-line. At last, after several attempts, I managed to clutch the edge of the top plank of the flume. Exerting all my strength, I pulled myself up so that my chest rested on the top edge of the plank. Our house was very near the flume, and every time I had raised myself out of the water I had screamed for help. While resting on the top plank the first thing I saw was my mother running rapidly to my assistance. She soon rescued me from my perilous position and took me home. I was nervous and frightened, but I remember distinctly how safe I felt when I found myself folded in the strong arms of my father.

We were living at French's Mills when I was eight years of age. At that time at least three-quarters of the country was covered with primeval forest, and, consequently, trees were not considered of much value. There was a large

balsam fir standing all by itself in Mr. Lucien French's pasture, and I was very ambitious to fell this tree. We had a large butcher's knife made out of a mill-saw file, and when I had ground this very sharp I commenced operations, but found it a very tough job. However, I kept hacking away eight or nine hours every day for about a week, when it appeared to me that with a very little more cutting the tree would fall, so I invited my sister, who was eighteen months younger than myself, to come and see the sport. I worked vigorously, but the tree refused to fall, and my little sister went to sleep. I thought the next day would certainly finish it, so my sister came again, but with the same result. I had cut a deep groove all round the tree, but there were five or six inches still left that were very difficult to get out. The next day I ground the knife very sharp at the point, so that it could be used like a chisel, and again my sister put in an appearance, but the tree still refused to go down. The following day my sister would not go with me ; she had become discouraged. I, however, worked on the job until about four o'clock in the afternoon, when I heard a crackling noise at the point of the knife, and, looking up, I saw the big tree toppling over. This was the proudest moment of my long and eventful life ; nothing since has equalled it.

Shortly after I saw Mr. Lucien French approaching at a gallop. I expected he would pat me on the back and tell me what a wonderful boy I was. Instead of that he was extremely indignant and scolded me for having cut down a tree that afforded shade to his cattle, but when he saw that I had done it with a knife he commenced to laugh. Soon a lot of the neighbours came to see what was the trouble, and I was not at all pleased with what one of them said. One called the chips that I had cut out " saw-dust " ;

another said, " Poor little fellow, just look at him, he is all covered with pitch ! " I was asked how long it had taken me to cut down the tree, and I replied, to their astonishment, that I had worked on it every day for about two weeks.

Many years later I visited Maine, and while staying with my uncle, Captain Samuel Maxim, I took a short cut through the woods to French's Mills. When I emerged from the woods I saw a very old man working in the fields, and as I approached him he looked up, stared at me, and finally walked to meet me.

He seized me by the hand and said, " I believe it is Hiram."

He then commenced to laugh, and when I asked him what he was laughing about he said, " You were such a curious kind of a boy."

" But I must have been very much like other boys ? " I said.

" No, not a bit," he replied ; " there never was another boy like you. On one occasion, when I called at your father's house you had a big bottle-fly by both wings. Gradually you pulled them apart until one of them gave way. Then you said in a very thoughtful manner, ' This fly's wings are not put in even ; if they had been they would both have pulled out at the same time.' You are the only boy in the world who would ever have thought of cutting down a big tree with a butcher's knife. Then again you managed to catch every fish in the river, leaving nothing for anybody else."

My father was not satisfied with living in such an out-of-the-way place as French's Mills, so he moved his machinery to the village of Milo. We had not lived there very long, however, when he learned of an excellent site with splendid buildings and water power in Orneville—ten miles distant

—where there was an abundance of timber that could be had for the cutting. Shortly after settling in Orneville my father took over the local grist mill. It was a very fine mill equipped with three runs of stones and all the necessary machinery that goes with a first-class grist mill.

While living at Milo there was an encampment of Penobscot Indians in the swamp near the village, who made baskets and other squaw work which was very pretty and brought a fair price. In those days the white people as a rule built their houses on the hills; they would never build in a valley if they could help it, and would cut down all the trees near the houses. The Indians, on the contrary, sought out the densest swamp they could find in which to pitch their tents and build their wigwams. Once when the local blacksmith gave me a small steel trap to take over to the Indians' camp, I remember that I found the wind very cold on the high ground where the white men lived; the sun, however, was shining brightly and the snow was very deep. When I entered the thicket where the Indians were encamped the sun shone between the tree-tops; there was no wind and the snow was actually melting in the sunshine. It then occurred to me that the Indians are much wiser in some respects than the white men.

The principal camp was made of small logs built up like a log-house, the cracks between the logs being filled with mud and bog moss. The log work was about four feet high and from this a large number of poles ran up at an angle of about forty-five degrees, and these were fastened together at the apex, leaving a hole about four feet in diameter. On top of these poles was placed a quantity of cedar boughs, after the manner of a thatched roof, which shed the rain beautifully. The fire was built in the centre of the house under the hole, and around the fire and up to the walls

spruce and cedar boughs were laid flat on the ground to a depth of about four or five inches ; on top of this was a lot of straw obtained from the farmers. There were no chairs and only one small table ; however, some billets of wood answered for chairs in case of white visitors. Every one slept with head to the wall and feet towards the fire. A very thick and dirty blanket served for a door.

The Chief of this particular branch of the Penobscots was Sap-ill-su-sip. He was a great friend of my father, and from him I learned many of the secrets of trapping. He said: " Hiram, if you wish to catch a mink, use a log trap and make it up of old stuff, nothing that is newly cut ; the older the better. If you set a steel trap for a fox, boil it with spruce boughs and don't touch it afterwards if you can help it, but cover it up with grass. The best bait for a mink is a fish, and the best for a fox, a bit of meat. If you wish to catch musquash, use a steel trap. If you fasten it so that he cannot drag it into the water, he will gnaw off his legs and escape. If you set it near the water's edge he will pull it off into the water and be drowned. The best bait for a musquash is a parsnip cut so as to look white."

On one occasion my father asked Sap-ill-su-sip what animals were good to eat. The list seemed to include almost everything, the best being the flesh of a musquash. He said: " Every animal that will eat meat will eat a musquash, but no man nor animal will eat the flesh of a mink."

Sometimes the white men would go into the Indian camp in the evening to play cards. As none of the squaws knew how to play, and only two Indians took any interest in the game, I was sometimes invited to make up a four-handed game. The game was " poker." A white bean counted for a dollar and a kernel of yellow Indian corn for five dollars, but these were not redeemable in real money.

The summer following the visits to the camp of the Indians my father ordered from Sap-ill-su-sip, a very large basket for taking the shavings out of his workshop. For the purpose of making the basket Sap-ill-su-sip hired a room in a small house, but when he had made it he found that he could not possibly get it through the door.

The State of Maine at that time was a wooded country, with many saw mills. A peculiar flat file was used for sharpening the saws, but when these were worn out they were of no value and were given to the Indians, who would put them in the fire, take out the temper, and then bring them to my father's mill, where we had a large power-driven grindstone. The teeth would be ground off, the files made smooth on both sides, and then taken to the blacksmith, who converted them into various kinds of knives. The knife most used was bent up like a hook at the end and was used for scooping out wooden dishes.

At Orneville my people were fairly prosperous. I was twelve years of age and attended the local school, and between terms I enjoyed myself very much fishing on Lake Boyd. There were plenty of fish in those days, and I became fairly expert in catching them. I had no boat, and had to depend on a raft made out of logs. One of the farmers who lived on the other side of the lake about two miles distant had built a large, clumsy, flat-bottomed boat. Not being satisfied with the climate of Maine, he emigrated to the West, leaving the boat without an owner. It then became the correct thing for everybody living about the lake to steal the boat from the man who was in possession. I was anxious to take part in the game, but as I was only thirteen years of age I could not very well undertake it alone. After a good deal of time and trouble I succeeded in talking a young man into joining me in the plot. Although

twenty-two years of age, he was little or no stronger than myself; however, it was the best I could do, and so early one Sunday morning we visited the lake, found an old raft and some poles, and after slight repairs succeeded in poling and paddling this affair across about a mile of water to what was known as the "Jack landing." We found the boat about one hundred feet from the water, bottom up. With a great deal of trouble we succeeded in righting it and working it down the bank to the water. As there were no oars or paddles we had to be satisfied with the poles that we had used on the raft.

We started out gaily, but we had not gone more than half a mile when we were struck by a terrific squall; the water became feather-white in no time, and we had all we could do to bale out the boat with a piece of board that we had found.

It was then that my twenty-two-year-old partner-in-crime repented. He said that it was a judgment that had been brought upon us, and that I was to blame for it; it was bad enough to steal the boat, but to steal it on Sunday was something more than a crime—it was a sin; we should probably lose our lives, and I was to blame for it all. He stopped rowing and baling and commenced to pray, but I continued baling out the water and managed to keep the boat afloat.

The wind being very much in our favour, we were quickly blown into the river leading from the lake, where the water was quiet, and soon reached the dam which had been built to regulate the flow from the lake for the mills. We attempted to get the boat over the dam, but it refused absolutely to come out of the water; it was too heavy for us. After tugging away for fully an hour my accomplice thought we had better abandon the job.

At that time the water was high and pouring in torrents over the dam. I suggested that we should run the boat over the falls, but my accomplice was sure that such an attempt would only result in loss of life. However, I jumped into the boat, got a good hold of one of the seats and went over. I found myself completely buried in white spray, but a wooden boat will always float, even if full of water, and I was soon again above water and going down the rapids, where I managed to effect a landing. By the time my friend arrived I had baled the water out of the boat.

An hour later I had it safely landed on the banks of my father's mill pond. I at once ran up to the house and brought my sister down to see the prize, but her remarks were most discouraging.

"How foolish of you, Hiram, to go through so much trouble and danger to get possession of such an ugly old boat."

But I was satisfied to know that Johnnie Robins, the previous owner, would not be able to get it back over the Falls, and I found it much better than a raft for fishing purposes in the mill pond.

CHAPTER II

MONEY was extremely scarce in the part of Maine in which we lived. Trade was largely a question of barter. The local merchants took grain, eggs, butter, cheese, hay, and potatoes in payment for what was euphoniously called at the time "dry goods, groceries, and grindstones," boots, shoes, etc.

One day a very good-looking man appeared in Orneville. He was a sea captain, the first I had ever seen. He had little to say, but I admired him immensely, and my amazement was great when I learned that he received the enormous salary of one hundred dollars a month for commanding a big and beautiful three-masted ship.

At that time the shipping of the United States was rather large. It was before the days of the *Alabama*, and no less than two-fifths of the tonnage was built in the State of Maine.

Encouraged by the possibilities of enjoying such an enormous income, I at once determined to become a sea captain. The following evening, managing to get my father all by himself, I asked him many questions. He said if I were to be a sea captain it would be necessary for me to study navigation. I was already expert in geography, and was quite able to understand all that my father said.

He explained how latitude and longitude were found at sea, that the compass only indicated the north and that there were several ways of finding the latitude. One was to take

the height of the sun at noon with a delicate instrument, but the sun was a different height every day in the year. The simplest way was to find the height of the North Star. If one were at the North Pole the North Star would be directly overhead; if one marched southward the North Star would become lower and lower every day and finally disappear below the horizon at the equator. It was therefore only necessary to find how high the North Star was in order to determine the latitude. Longitude was found by comparing the noon of the ship's chronometer with the noon on board the ship, which was obtained by taking the greatest height of the sun above the horizon for that particular day. As one sailed eastward noon would occur earlier each day while the noon of the chronometer would remain constant; the difference between the two indicated the longitude.

I understood all of this perfectly. The next day I told my sister that I had fully determined to be a sea captain, and thought it was time I commenced to get ready. I could not purchase the chronometer, but felt quite sure that I should be able to make an instrument that would determine the latitude. I obtained a piece of board about half an inch thick, planed and sandpapered it on both sides, took a pair of dividers, struck a half-circle, and spaced off an index, figuring it with a lead pencil. My mother furnished me with a piece of black linen thread, to which I attached a bullet and passed the thread through the hole made by the dividers. That night I took the instrument out and sighted it to the North Star, while my sister, with a candle, examined the reading, and found that the black thread was directly over the figure 45. Going into the house I told my father what I had done, and showed him the instrument. He pronounced it very good and said that the reading indicated

that we were at 45° north latitude. We then examined a map of the State of Maine and found that my instrument was correct. But I did not go to sea.

Shortly after this my father obtained for me a book on astronomy, also Comstock's *Natural Philosophy*, both of which I eagerly read and reread. Books were very scarce in those days, so I made the most of those that I could obtain.

There were several saw mills in the town of Orneville. One of these belonged to a man by the name of Lord. As he was a lay preacher and a great exhorter in the numerous prayer meetings, he was called Elder Lord. In connection with his saw mill he had a small store, and used to deal with all the farmers in the vicinity. A peculiar thing about Elder Lord was that he could neither read nor write, which was very exceptional in the State of Maine. He was probably the only man in the county completely without an education of some kind.

On one occasion a neighbouring farmer was settling accounts with him and found that a cheese had been charged to him. He maintained that he was a producer of cheese himself, that he made them for sale and had never bought one in his life. However, the Elder pointed out that a cheese was charged in the book, for was there not a drawing of it? He showed the book, and sure enough there was a pencil sketch apparently of a cheese. After a lot of dispute the Elder said: "Oh, I see, I've made a mistake, it was a grindstone, but I forgot to put the hole in it." Years later this story, which was quite true, found its way into the newspapers.

At the age of fourteen and some months I was put to work with a carriage maker by the name of Daniel Sweat, at East Corinth Village. When my father took me to old Sweat's place he called his attention to the fact that I was a

very large and strong boy. He said I had been brought up to the use of wood-working tools, that I had built an excellent boat, and was a natural all-round mechanic; very handy with machinery and able to tend a grist mill as well as an expert.

Old Sweat looked me over, said he thought I would do, and I commenced work.

Ordinarily a boy is put to do something simple at first, but old Sweat gave me a journeyman's job. I was to make six wheelbarrows such as were used by the farmers in Maine at that time, and were very much finer than any to be found in England to-day. I got on with the work splendidly, being much interested in it, and when I had finished the job old Sweat brought in a lot of men to look at the result. He said, "This is the boy's first job; they are the best lot of wheelbarrows I ever saw."

At that time farm wagons and carts were provided with wooden axle-trees made out of four-inch seasoned rock maple plank as hard as horn, and it soon became my job to take out the old worn-out wooden axle-trees and replace them with new ones. First I had to get the right pattern and mark out on a plank the axle-tree required, then saw it out by hand, form it into shape, take off all the iron on the old axle-tree, put the shafts and irons on the new axle-tree, and give it a coat of lead colour—all in one day. A job of this kind would last the average British mechanic at least a week, and by careful nursing under the supervision of a highly trained labour leader it might be made to last two weeks.

It was summer, and we commenced work at five o'clock in the morning. At seven we went to breakfast. Work was resumed at seven-thirty, and continued until the dinner-hour—twelve to one. I used to appreciate the short mid-

day rest very much indeed. At five o'clock we had supper, after which we again worked until sunset. In after years when there was a strike of my men in New York for an eight hours' day, I told them that the eight-hour system was nothing new to me; I used to work eight hours in the forenoon and eight in the afternoon.

As soon as the sun had disappeared it was my duty to go into the woodshed and chop the wood for the next day; then to bed, which I reached at about half-past eight. When I first went to old Sweat's I was hungry all the time. It was always "flap-jacks" and treacle, and nothing but "flap-jacks" and treacle, for breakfast. At first I was lucky if I got one, but I had not been a week in the place before I became as expert as any at the table in capturing "flap-jacks" as they were brought from the frying-pan to the table. Dinner in the middle of the day consisted of fried pork and salt fish, boiled potatoes, bread and treacle. This was a sumptuous repast; very few could afford it. For our five o'clock supper, we had bread and treacle, and occasionally enjoyed the luxury of a bit of butter.

While working for Sweat I had the enormous salary of four dollars (16s.) a month, but this was not paid in cash. That would have been altogether too much, and I had to take it out in trade at the local stores. On the whole I had a very rough time while at Sweat's.

One evening I was pressed by young Mr. Sweat and a friend of his to join in a four-handed game of "seven up." My partner was rather stupid, but I understood the game perfectly, having played cards a good deal in the Indians' camp at Milo. Sweat and his friend beat us ten consecutive games straight off. In the meantime I had detected that both Sweat and his partner were cheating. My partner got discouraged and wanted to stop, but Sweat insisted on

continuing the play, saying that they would cease when they had beaten us twenty times. I was sitting on a very low stool, and the table on which we were playing had a little shelf underneath. Very soon I had quite a store of aces, knaves, and two-spots stored away, after which we beat the Sweat party every game, and beat them badly.

While at East Corinth I learned that a boy by the name of Rand Bean, living not far away, had a pack of cards. I wanted that pack of cards badly, but money was very scarce; grown-up people had very little indeed, while children had none. After taking an inventory of my property, I found that the only things I had that were negotiable consisted of a sailor's song book, a buckle, and a leather shoe string. Placing this valuable property in my pocket, I sought Rand Bean, but didn't venture to ask him out and out if he had a pack of cards, believing that it would be better to beat round the bush a bit. I commenced by showing him the song book and reading to him such songs as "The Blue Bells of Scotland," "Black-Eyed Susan," "The Colleen Bawn," etc. He seemed to be delighted and said he would very much like to purchase the book if he had anything that I would take in exchange. He had a jack-knife that originally had two blades, but one was gone and one side of the handle was missing. I looked at it with contempt. Then recollecting his pack of cards, he produced them. Counting them over, I told him that two were missing, but as they were unimportant ones it was not long before I succeeded in making the exchange.

It was Saturday night, and when I took my cards home I found my father reading, my mother busy, and my sister peevish and fretful. The next morning, Sunday, I took up a position where I could watch old Deacon Hunting's

house, and it was not long before John, his son, saw my signals and met me behind the wood pile. He was learning his Sunday-school lesson and had the book with him. I took the pack of cards out of my pocket and showed him some of the picture cards.

"Are those the cards that are so dreadfully wicked?" he asked.

"Yes."

"I have never seen any before," he replied.

I would say in parenthesis that playing cards at any time was considered very wicked by the Puritans in the State of Maine, but to play cards on Sunday was nothing less than a criminal offence.

John was very much interested. He said he would run down under the bank of the river where they couldn't see him and get into the saw-mill, while I went back of the barn to the river below the saw-mill, and we would meet at the nigger wheel. Everything turned out as we expected, and John was most anxious to become acquainted with the pack of cards on account of their extreme wickedness. The game essayed was "seven up," sometimes called "High Low Jack and the game," the most common at that time of all card games. But John was very slow to learn. After several attempts at a game, all of which failed, I laid the cards out on a plank between us, and just as I was explaining tha ace would take a king, a king would take a queen, a queen would take a Jack, etc., I espied old Deacon Hunting approaching with a club in his hand.

John gave a yell and instantly slipped down the place where the sawed timber was discharged, but I stopped to gather up my precious cards, and by the time I had the last of them, the Deacon was within ten feet of me and between me and the hole where John had escaped. He then

cornered me up, shouting, "Oh, you bad, wicked, Sabbath-broaching boy."

By shifting his club from one hand to the other he drove me out on to the slip which ran out into the pond, and as he followed me up he said, "Now I've got you, you wicked little wretch, you Sabbath-broacher," but I dipped my bare feet in the water and took my chances, skipping very rapidly over the floating poles and small logs, not giving them time to sink, and finally reached the shore in safety. I looked across the water at the old Deacon and held up my pack of cards while he shook his club at me.

My father finally moved back to Sangersville village, and so one day I told old Sweat that I was going to leave him. I packed up my belongings in a large red cotton handkerchief and started for home.

After covering twenty miles I found myself at the house of my uncle, Captain Samuel Maxim. My cousins were very glad to see me, and I remained several days. Then walking to Sangersville village I at once obtained a situation where they were making hand rakes for farmers, and did a journeyman's work from the first day. I continued this work until the winter term of school commenced.

While attending school at Sangersville village the young men and boys used to get together in the evening and box. A young gentleman who had been to Boston had brought home a set of very good boxing-gloves. I used to box with boys of my own age or a little older, but my brother Henry, after he had had a little practice, was such a hard hitter that none of the boys of his own age would put the gloves on with him a second time, and he was matched against boys considerably older and bigger than himself. On one occasion he was asked to put on the gloves with a boy four years his senior. He objected strongly, saying, "He is

four years older than I am, it isn't fair." The good-natured wag of the village was present and said: "That's nothing, I've often put the gloves on with old Elder Clark, and he is four times as old as I am."

This reminds me of the doings of this ancient clergyman. He was a cousin to my mother, a Universalist and eighty-four years of age. He had plenty of hair, but it was as white as cotton wool, which it very much resembled. His wife died in the spring following our boxing lessons, in which he took a lively interest, putting on the gloves himself with young men.

About two weeks after his wife's death I saw approaching me in the main road what I took to be a young gentleman from the city. His lively and dapper figure was rigged out in a fine black broadcloth coat, a white vest, light grey trousers, and patent leather boots, the whole surmounted by the shiniest kind of a silk hat. He wore gold-rimmed eye-glasses, pale yellow kid gloves, and carried a light gold-mounted cane. His teeth were very even and shiny and his hair as black as night. I had never seen any one so beautifully attired before. He was a very striking figure, and was tripping along like a girl of sixteen. It was old Elder Clark. But there was one drawback to the *tout ensemble*. Although he was rather fleshy, his face was about the colour of a bladder of lard and with not a few wrinkles. Two weeks later he married a maiden lady of the tender age of forty.

By the way, this remarkable parson was a relative of the Captain Clark who commanded the U.S. battleship *Oregon* on her voyage from the Pacific coast through the Straits of Magellan, to take part in the Spanish-American War. On that occasion it was found that the *Oregon* was able to keep alongside of the Italian-built Spanish cruiser

that was supposed to be at least five knots an hour faster than the battleship.

In the autumn that I arrived in Sangersville village all the boys were attempting to catch minks, their skins being very valuable. Acting on the advice of old Sap-ill-su-sip, I set a trap at the foot of the lake and caught all the minks that were on the river: in fact I was the only one that caught a mink that year.

As soon as school finished in the spring, I went to Abbott Lower Village, where there was a rather fine carriage shop equipped with many machines all driven by water-power. This belonged to a man by the name of Daniel Flynt, who was quite a genius in his way. My father gave me a very good recommendation, called the attention of Mr. Flynt to my large size, and told him that I could do a man's work and do it well. Flynt put me to work, and we remained the greatest of friends from that day until his death. The power-driven machinery in Flynt's place made the work much easier. He had a good house, everything was neat and clean, and the table all that could be desired, but the hours were the same as the Sweat system—practically eight in the forenoon and eight in the afternoon. In the early spring when I entered Flynt's employ there was not much doing in carriage-making. There were others employed about the premises, but I was the only one in the wood-working shop for a considerable time.

For several years previous to my engagement at Flynt's I had been studying drawing, that is, simply drawing faces, etc., with a lead pencil, and every new face I saw that was at all odd I attempted to draw out and remember. I had not been very long in Flynt's employ when a man came in who had a very peculiar face, at least I thought so, and while he was talking I sketched him. He was anxious to

THE FAVOURITE DECORATION FOR SLEIGHS VERY HIGHLY COLOURED

find Mr. Flynt, but I was unable to tell him where he could be found.

An hour or two later Flynt came in, and I told him that a gentleman had called to see him.

" Who was it ? " he asked.

I said I didn't know.

" You certainly should have taken his name," he replied ; " don't let this occur again. When any one calls to see me you should always write down the name."

I thereupon picked up the sketch that I had made and said, " That is the man."

Flynt fairly shouted, " Oh, that's Charles Leman," and he ran out to show it to his friends.

I got on very well at Flynt's. We confined our work to making and repairing carriages ; but Flynt had a relative living at a distance who made sleighs ; he had a factory and turned them out very cheaply all ready ironed, but not painted. Flynt bought a lot of these, brought them to his own factory, and painted them. At that time it was the fashion to have some kind of a picture, such as a bouquet of flowers, a landscape or some animal, painted on the dash-board ; the back and sides were also ornamented with some sort of a painting, small in size but very showy. Flynt was able to do the striping himself, but not being an artist he could not paint the pictures that were required, and had to depend on a man who lived three miles away and charged a very high price for his work. One day, when Flynt was anxious to send out some of the sleighs, the man failed to put in an appearance ; he had another job. Flynt was greatly disappointed, so I suggested that perhaps I might do the job myself. He laughed at first, but after some hesitation allowed me to try my hand at it. He was much elated at my success, and within two weeks

he said, "You can beat the other fellow out of his boots."

After that I did all the decorative painting. The favourite piece for the dash-board was a small oval landscape showing a few trees in different degrees of dilapidation, a body of water, and about three mountains in the distance, the sky being very brilliant. On each side of this landscape were painted roses and rose-buds with green leaves, some of them tinged with brown. The colours that I used had been obtained direct from Windsor and Newton, 38 Rathbone Place, London, and were the very best. They were a great improvement on the colours that I had made myself when twelve years old, while the brushes were much better than those I made from hairs cut from the baby's head and drawn into the quills of a domestic fowl. I would say in this connection that no human hair is of any value for a brush if it has ever been cut—you must have the clippings of the first crop if you wish to succeed.

One day while I was working at Dan Flynt's the driver of the stage-coach stopped in front of the shop and called out, "I just now saw a bear cross the road in front of my horses, and I had all I could do to prevent them from running away." About two minutes later a little boy ran up and said that his mother had just seen a bear, and in a few more minutes another woman sent a message that she had seen a bear enter a little clump of trees about ten acres in extent, very near the village and completely surrounded by cleared land. Every one was after a gun at once. As I had no gun I armed myself with a hatchet and joined the procession. Those who had guns, and all the dogs, were very soon in the woods, while those who had only axes, hatchets, and clubs surrounded the woods. The hunt had not proceeded very far when out came the bear, and as he

ran up to the fence alongside the road a man with nothing but a big felt hat faced him. He kept on the opposite side of the fence, and every time the bear attempted to get over, he hit him in the face with the hat. Finally, however, the bear ran along the fence a little too far and got over before the man could face him, but of course there was a fence on the other side of the road. As it was rather a high one the bear attempted to crawl through. He got his head through all right, and then stuck for a time. The man came up with some rotten wood and broke it all up on the bear's back. The bear gave a grunt, raised up the fence and got through, ran up and over the top of the hill and disappeared into the dense swamp, followed by about twenty dogs. In going up the hill he passed within thirty feet of the two women who were watching the hunt ; they did not appear to notice him. I ran up in pursuit with my hatchet, but soon gave up the chase. I asked the women why they had not looked at the bear, and one of them said to the other, " I do believe that the largest of those dogs was a bear."

Many bear hunts took place in that part of Maine, and in nineteen cases out of twenty the only result was a few dead dogs. It was the greatest ambition of my father's life to kill a bear, but he never succeeded. My grandfather Stevens, however, was very successful, capturing about four bears a year. Each was worth about five dollars for the bounty and skin, and the meat, of course, was worth something. But that bears can be successfully hunted is witnessed by the fact that an old hunter who lived in the dense forests on the shores of Moosehead Lake had actually killed over ninety before I left the States, and he said he hoped to live until he had killed one hundred.

I worked for Flynt for about four years except during the long term at school in the winter. In the meantime my

father, evidently wishing to be near me, and hearing of a grist mill without a miller, moved the family to Abbott.

About nine months in the year I lived with the Flynt family, and three months, while attending school, with my father. I was the eldest of the family, and often, after being at school all day and working on my sums at home up to nine o'clock in the evening, I used to go over to the grist mill and take charge until morning.

In those days there were many men working in the woods about Moosehead Lake, and large and heavy sleds drawn by four horses would pull up at the grist mill at about six o'clock in the evening with a load of oats, peas, and barley, in separate bags. The oats and peas had to be mixed with the barley and the whole ground together. Each bag held exactly two bushels, and there were a good many bags. Ordinarily the miller takes toll—two quarts to the bushel—but in these cases they paid cash instead, and it was therefore very difficult to get the meal back into the bags that held the grain. The run of stones used for grinding this fodder was driven by a very powerful water-wheel, and the output was just a bushel a minute. The bags had to be seized and thrown on to a table about five feet high, untied, the contents mixed in the hopper, and the meal shovelled back into the bags, every ounce of it, and beaten in with a rammer. This was very lively work.

I imagine it would take at least three men to-day to attend to a mill of this kind ; but I used to continue it all night and go to school next day. My father, however, came early in the morning, so that I got a few hours of sleep before school time at nine o'clock. Moreover, this didn't happen every day, but only about two or three times in the week.

It is interesting in this connection to note that during the last year of this vigorous exercise I was the only scholar

that never lost a minute at school, and I kept what was called the " tally " of all the other scholars. The master said that I was the only one that could be relied upon to be present.

Years later, when I had an opportunity of showing off my physical strength, I was asked if it might not be the result of long and laborious training. I said, " Quite so," and told what the training was.

On one occasion a big sled had a row of barrels of pork on its rear end, and it was necessary to remove them to get at the bags of grain. The driver asked me if I had a man to assist me. I said, " No, I can do it alone." He laughed and said it was impossible, but when I took up a barrel of pork, walked off with it, and set it down in the snow, he shouted, " Look out, young feller, yer legs'll break off and stick into yer." These barrels were very heavy indeed ; I do not know how much they weighed, but it must have been somewhere in the vicinity of 400 lbs. The pork itself weighed 200 lbs., the brine was nearly as heavy, and the barrel also very large and heavy.

The grist mill at Abbott, like all other grist mills, supported a swarm of mice. There were no rats in Maine in those days except in seaport towns. While working in Flynt's carriage factory I used to make a few box traps in the noon hour and on Sundays, but the trouble with these traps was that when they had caught a mouse they were full and could not catch another until the first had been taken out. I therefore decided to make an automatic mouse-trap, one that would wind up like a clock, and set itself a great number of times. This trap was to be worked by a coiled spring after the manner of a clock. At that time the women were wearing hooped skirts. The hoop itself was usually made of hard rolled brass, very thin and light and susceptible

of being made into a suitable spring. I attempted to buy a single hoop at the village store, but they were only sold in sets of three. After a great deal of negotiation the store-keeper agreed to let me have the three hoops for thirty cents. With considerable trouble I raised the money, purchased the set, and attempted to sell two of the hoops for twenty cents, but failed. By getting up very early on Sunday mornings and going to work at daylight and working all day, I succeeded in making a trap that was quite automatic in its action. The body part was made of very white crinkly basswood, which is very beautiful when varnished, and this was ornamented with dark mahogany strips which made the basswood appear like panels. When it was finished it certainly had the appearance of a very pretty piece of cabinet work.

It was about four o'clock one Sunday afternoon when I finished it, and I took it round to the store-keeper to see what he would think of my work. He said it was splendid, wonderful, and would, he believed, work perfectly. So he cut off a bit of the butt-end of a candle, attached it to the double hook that was made for holding the bait, and put the trap in a place where the mice were numerous. On my return from supper we went into the store to see what had happened, and found five mice in the cage looking at us with their noses projecting through the bars. The trap was a success. It was shown to every one in the village, and borrowed to be put on exhibition in the neighbouring villages.

Although this trap was successful, it was too expensive and elaborate to make and sell; so I studied out another plan, and made one that required no coiled spring, the mouse himself doing all the work. His mouseship walked in, and, touching the bait, shut himself in; this frightened

THE AUTHOR AT THE AGE OF SEVENTEEN

TAKEN WHILE WORKING FOR DANIEL FLYNT, ABBOTT, ME.

him ; he would attempt to escape, and did escape into a small cage, but in doing so he set the trap for the next customer, and so on.

Many years later I went into a shop to purchase a mouse-trap. On being shown the one which the dealer recommended as the very best, I was surprised to see the very thing which I had invented when a boy.

After another winter at school and in the grist mill, I resumed work in the carriage factory, doing both woodwork and painting.

In the olden days every one was expected to attend public worship at the local meeting-house on Sunday, and before the Indians had been exterminated or subdued, every man took a loaded musket with him to church and a quantity of ammunition. The pews were long and narrow, and the man with the gun always had to get out of the pew to allow others to enter. It was necessary for him to have the end seat so as to get out of church quickly in case of an attack. This habit continued long after the men ceased to take their guns to church.

Deacon Stevens, my mother's father, lived near Abbott Upper Village, and I used to pay him an occasional visit. On week-days the family were up at five o'clock ; breakfast was generally served at six, but before breakfast the Deacon asked the blessing, which occupied about ten minutes. After breakfast, with all of the family present, he would read a long chapter in the Bible, very deliberately ; and then all would kneel down for family prayers, which lasted about three-quarters of an hour. At noon about twenty minutes were spent in asking the blessing at the table and again at five o'clock supper another twenty minutes were consumed in the same way. In the evening we had another long chapter from the Bible, and another very long prayer.

In fact, the whole day was one series of religious devotions, and my grandfather had so much religion to the square inch that the neighbours called him "Old Brimstone Stevens."

Early in the season I decided to make myself a tricycle, and by getting up every Sunday morning at daylight, working until dark, and working a whole day on the 4th of July, I succeeded early in September in producing my tricycle. It is a curious and interesting fact that the wheels of this tricycle were the first ever made in America in which two sets of spokes widely divided at the hub supported the rim of the wheel by tension instead of by compression. The spokes were of white ash and very slender; that is, they were wooden wheels made on the same plan as the bicycle wheels of to-day. This tricycle was used by my younger brothers and other boys about the village, and for a time was a nine days' wonder.

About a year later while my tricycle was being ridden rapidly by my brother Leander, Farmer Clark's horse became frightened and shied, but did no damage. As the tricycle stopped in order to allow the farmer to get away with his horse, he improved the opportunity by smashing it. He said the wheels were the toughest things he ever saw. He soon found out, however, that he had made a great mistake and was liable to a heavy penalty for stopping and destroying a vehicle on a public road; and to keep the thing from getting into the courts, he took the broken machine to Dan Flynt's carriage factory and ordered it to be repaired. Flynt put his best man on the job, but after two or three weeks of fruitless work he reported that it was too much for him; there was only one man in the world who could produce that kind of a wheel, and he had left Abbott for good. So the beautiful machine that had been such a nine days'

wonder remained at the carriage factory, and was finally destroyed when the place was burned down.

The following February I was twenty years old, and my father told me that if I would tend the grist mill during the winter and allow him to work in the wood-turning shop, he would give me the remainder of my time, which would be about nine months. I agreed to this and took full charge of the grist mill during the winter. Many times I had to work both day and night.

In the spring I again went to work for Daniel Flynt in order to earn a little money to purchase clothes and get out of Abbott. I wished to go to a larger place where I could get more money for my work. My freedom notice was published in *The Piscataquis Observer*, according to the habits of the country, my father relinquishing all claims on my earnings.

CHAPTER III

WITH a few dollars in my pocket I started for Dexter, Maine. I had heard that one Ed. Fifield was in want of a decorative painter, and I hoped to get the job. I arrived in Dexter at about two o'clock in the afternoon and applied at once for the situation, but was told that an excellent man had already been engaged; in fact, the best decorative painter in the State, which I think was true. He was sorry that he couldn't give me a job as a painter, but told me he was very much in need of a good wood-turner, and asked me if I knew anyone whom he could employ. I told him that I would take the job myself. He laughed and said that anyone could put a piece of wood in a lathe and scratch it off a bit, but nothing less than a first-class professional wood-turner was any good in a cabinet shop. When I told him that my father was a wood-turner, he wanted to hire him; but that was impossible. I informed him that as I had worked in a carriage shop four years, and done all the wood-turning, I felt certain that I could do the work. He finally consented to take me to the wood turnery to show me the work and the lathe. It was the finest lathe I had ever seen and I assured him that I could do the work.

He said, "Very well, I will give you a trial."

I asked him what the first job would be. "Ten sets of bedstead posts," he replied.

I asked how long it generally took a wood-turner to do

such a job, and he said, " The cleverest turner in the State s a man who can do ten sets in a day ; the next best is one hat can do eight sets in a day."

The head cabinet-maker laid out forty pieces of seasoned ock maple, four inches square, all cut the proper length, nd furnished me with a specimen bedstead post. I asked f I might be allowed to put everything in order then and here, so that I could commence to work the lathe the first hing in the morning.

" Certainly," was the reply.

I then swept the floor, cleaned the lathe, and laced the elts, as they did not seem to be taut enough for the pur- ose. I marked the centres on all of the blanks for the osts and put a drop of oil on the end that was to run on the ead centre. I took all the tools to a power-driven grind- tone, and made the edges of them thin and keen. I was articularly pleased with a very large gouge such as was ctually used by my father for rough work. When all the ools had been made as keen as a razor, I mounted the pecimen bedstead post in the lathe, found the rest that ould fit it, filed the rest perfectly smooth, sandpapered it, hen drew with a lead pencil a half section of the post on he white wood rest, and, removing the specimen post, placed ne of the square joists in the lathe, and everything was ready.

The next morning at the first turn of the water-wheel he chips commenced to fly. At about two o'clock in the fternoon the head cabinet-maker came down to tell me hat they had just received an order for two cribs for hildren. He brought down eight pieces of elm, consider- bly longer than the bedstead posts, with a specimen to be sed as a pattern. Of course, I had to alter the lathe to fit he longer object, and to put on a longer rest. However, went at it " hammer and tongs," turned out the eight

posts, shifted the lathe back, and went on with the rest of the bedstead posts; and when the wheel stopped after eleven hours' work, which was the rule in Dexter, the last bedstead post was finished.

Fifield and an old hand came down into the turning-room and examined the work. The old hand pronounced it to be perfect. "Nothing could be better," he said; "that young man has broken all previous records. It is the biggest day's work that has ever been done on a wood lathe in the State of Maine."

Everything was all right at Fifield's shop except the pay. Very little money was going and I was obliged to take my pay largely out of the local stores, receiving things that I didn't really need.

Dexter was a fairly large and very prosperous village. There was a pond about a mile wide and three miles long, in which sufficient water was stored to keep the mills and factories running the year round. There were three woollen mills. An English firm sent out a representative, and finding that the wool was of good quality and abundant, and that it could be purchased for a low price for cash, he took over two of the mills and started to make bed blankets. But it was necessary to import a lot of machinery from England, and to bring over a considerable number of men as instructors and foremen.

Up to that time it had been a curiosity to see a foreigner of any kind in Dexter village. The English operators were from Lancashire, and were a thoroughly sporting lot. They introduced among the people a good many English games, such as jumping, putting the stone, etc. At that time there was a most remarkable man—Allen by name—employed in a blacksmith's shop; he was the curiosity of the village on account of his enormous size. He was about thirty years

of age, had a clear, bright complexion, dark hair, and was, I think, as handsome a man as I have ever seen, notwithstanding his great size. From the very first the imported Englishmen took a great interest in this giant. He used a hammer very much larger than that commonly employed by blacksmiths, and on account of his enormous strength he never employed a striker to assist him with a sledge.

The Englishmen were of the opinion that if he could be induced to take up prize-fighting he could easily be the champion of the world, and this question was very much discussed at the time. But they wanted to see what he was made of. Did he have any courage? Would he fight? Finally they induced their employer to send out to England and bring over a skilful pugilist by the name of Taylor, who was acknowledged to be an expert mechanician on weaving machinery. This was noised about the town and many were anxious to see what sort of man Taylor would be.

At last he arrived and was given a position in the big stone mill. They told him marvellous tales about Allen, whom he was very anxious to see; so they gave him a broken bit of iron to take up to the blacksmith to have it welded.

While Allen was attending to the job he said to the man: "I hear that Taylor has arrived."

"Yes," was the reply.

"Have you seen him?"

"Yes, I have."

"Do you think he could lick me?"

"I doubt it very much."

The job was finished and as Allen handed the iron to Taylor he put out his big foot, saying, "Did you ever see anything like that?"

Taylor replied that he had not.

" Well," said Allen, " you just send Jim Taylor up here, and I will put him into one of those shoes and give him a sail on the river."

Allen was quite content to be a village blacksmith. He had no ambition to be known as a prize-fighter, and he continued to pursue the even tenor of his ways. However, when Christmas came, the Englishmen had managed to smuggle in a quantity of beer, and on Christmas Eve, when they were all feeling very jolly with both Allen and Taylor in their company, Taylor commenced to dance round Allen and gave him a few taps with his fist, very much to Allen's amazement. It was something like Don Quixote fighting the windmill. Allen knew nothing of boxing and had probably never had a fight in his life, but he thought he ought to do something, so he struck a blow after the manner of a woman. His big fist came down on the top of Taylor's head and Taylor collapsed. He did not get up, and it was thought that his neck must be broken. Allen was much upset ; he picked Taylor up in his arms like a baby, took him into an hotel and nursed and took care of him until he recovered, which he did in about a fortnight.

I had not been long in Dexter village when I learned that the young men were very much interested in boxing. The great international fight between Heenan and Sayers seemed to have caused an epidemic of boxing all over the State. Some of the sports examined me very much as a man examines a horse before he purchases it ; looked me over, examined my muscles, and all agreed that I had the exact make-up for a successful boxer. I had already thought of taking up the art, feeling convinced that I could very soon become a champion. As the 4th of July was approaching the young men asked me if I would box with Livingstone, the best man in town, on Independence Day. I replied that

I would, and we met in the livery stables, where there was plenty of room, with the thermometer registering 101 degrees in the shade. Livingstone was supposed to be very skilful. He was about my age but slightly smaller. He gave me all I could attend to for a few minutes, but as the weather was very hot, and I was at him all the time, he soon got winded, and I knocked him out with the greatest ease. Without taking off the gloves or wasting a minute, I knocked out the second best man. I was delighted. I looked in a mirror and would not have known myself, my face being as red as a beet.

Shortly after, I was told by an Englishman that I was not at all suitable for a prize-fighter. He said, "Your eyes are altogether too large and prominent; moreover, whoever saw a prize-fighter with such a big head? They are generally about the shape and size of a cocoanut." Later on, I saw old Dr. Springall, who had been my mother's physician, and was the only foreigner in town before the mill hands arrived. He was very wise, and I looked up to him with the greatest respect. He said, "Don't think of it; it is altogether beneath you; never give it a second thought." And I didn't.

While I was at Dexter the Civil War broke out; there was great excitement and no work, or if there was any work, there was no pay for it; every one seemed to go crazy. A lot of young fellows got together and formed a company, something like the Boy Scouts in England. The local shoemaker was the captain and we marched up and down the street with sticks exactly as the Boy Scouts do to-day. I very soon got sick of it, went back to Fifield's shop and began to work. But the Boy Scouts didn't like my leaving their ranks, and I was persecuted to some extent for not continuing to march. In the meantime I had had some

further conversation with old Dr. Springall. He told me that he thought I was altogether the most promising young man in Dexter; that I was a very hard worker, without any bad habits; that it might be all right for those less gifted than myself to go to the war, but it was my duty to stay at home and work; also that I would find soldiering a very hard job indeed. So I made up my mind to give it up and refused to go on.

The young men expected to offer their services to the Government for three months, when they thought the war would be over; but the Government didn't want any three months' men, and so the little company was disbanded. A few of them went to a distant town and enlisted in the regular way, but I was not among the number.

I speak of these events because some years ago a contemptible blackmailer attempted to make it appear that I had enlisted in the United States Service and deserted, running away to Canada. He succeeded in publishing this in some of the American papers; whereupon I wrote to the Adjutant-General of the State of Maine, who gave me a certified statement that the names of all the enlisted men were on file at Augusta, the capital, and that he had found the names of Leander and Henry Maxim—my brothers, but that my name was not on the records, which was proof positive that I never enlisted and was never in the service.

CHAPTER IV

IT has often been said that Maine is the best State in the Union to emigrate from, and I had long wished to get out of it, and go to some place where I could get more for my work, and have all my pay in money instead of partially out of the local stores. I had read a book about the St. Lawrence River and Montreal, and I wished very much to see the great river. Accordingly I took the train one day, and after many hours' travel I found myself in Montreal—the first time in my life that I had ever seen a large city. After seeing all the sights, including the great tubular bridge about which I had read much, I took a steamboat for Fort Covington, New York State, and had my sail up the river ; and very gratifying it was.

In less than a week after leaving Dexter I found myself in Northern New York. Two of my cousins had a rather large threshing-machine factory not far from Fort Covington and I expected to get work in their place, but thought I would first try in Fort Covington, as my capital had been reduced to 25 cents.

I applied at the wood-working establishments without success. Finally, I saw a paint shop ; I went in and asked the head-man for a job, but he had none to give. I noticed that there was a large white spot where he had tried his brushes on the side of the shop, so I produced my colours and brushes and painted an oval landscape, with roses at each side, the same as I had painted on the sleighs in the

State of Maine. The man was delighted, and at once hired me, sending me to another shop that he had at Malone, N.Y.

At Ma'one I simply did carriage painting and decorating, and only remained a few months. While there I learned that my cousins were attempting to open a threshing-machine factory in Huntingdon, Canada, which was only a few miles over the line. They were doing this in order to avoid paying the duties. I also learned that there was an American making sewing-machines in the same place, who wished to find some one to decorate them. So I left Malone, which was a very uninteresting place anyway, and went to Huntingdon, where I found that the threshing-machine factory had not commenced work ; in fact, a very curious state of affairs existed.

It appears that my cousins had made a special arrangement with the Canadian Government whereby they were allowed to import American tools free of duty, providing that they would start up their factory within twelve months. Under this arrangement, they had sent a number of lathes, drill presses, and wood-working machines to Huntingdon, and had taken a large building provided with water-power. But it was not all smooth sailing. Interested Canadians, by various legal tricks, injunctions, etc., prevented the use of the water-wheel, the object being to hinder the starting o' the works until the year had elapsed, when they expected to be able to purchase the tools very cheaply and run the factory themselves. Months went on, and there was always an obstruction to prevent the actual commencement of work.

Finally, when the end of the year came, a custom-house officer, whose business it was to search out and prosecute smugglers, put in an appearance and seized the machinery. Having done this he turned the whole thing over to the

local custom-house officer, who was a rather old man, an Englishman, and exceedingly fleshy.

A portion of the factory was built as it were out over the river ; there was only one large door connecting it with the land, and the first night after the seizure the local custom-house officer took up his position in this single entrance where he was expected to watch all night.

During the evening a Mr. Sam Ide, a very jolly Yankee from Vermont, who had worked many years for my cousins, put in an appearance. He told the custom-house officer a lot of very funny stories, and pointed out what a shame it was that a man of his age should have to stay on guard in such a cold and dreary place all night ; he was sure to get his death of cold. So he got a bottle of whiskey reinforced with " high wine," as it is called in Canada—a liquor which is just twice the strength of whiskey. He brought this over and supplied the officer with all that he wanted to drink. Not only that, but he went into a neighbouring carding mill, got some wool sacks and made up a very comfortable and warm bed for the officer of the law, who was soon in a profound slumber.

The next morning every one was astonished to find that all of the tools were missing. All the heavy lathes, drill-presses, and saws had disappeared completely, and the most extraordinary thing about it was that there were no tracks to show that any heavy carts or wagons had been near the place.

I was living at Milne's Hotel at the time and was much interested in listening to the discussions regarding the disappearance of the machinery. It was a mystery for which nobody could account ! Some went so far as to say that the Yankees must have been assisted by the devil.

As a matter of fact, when the custom-house officer had

been put comfortably to sleep, Sam Ide, assisted by some strong Americans, had oiled and sunk the tools in the flume where they remained under water for several days, until one dark night some vans arrived from the New York side, with the necessary apparatus for lifting the machines out of the water and loading them on to the vans. In a few hours they were safe on the New York side of the line.

The owner of the building was the principal man working the obstruction scheme. He expected to get possession of the machinery and tools and to run the factory himself. After the tools had been removed he told me that he intended to convert the place into a grist mill. I told him, however, that there was not power enough; while there was plenty of water in the river, the fall was not great enough, and the farmers who lived on the river above the dam would not consent to have the dam made any higher. However, he did not feel like taking advice from a "boy," and so he equipped his grist mill, only to find that, like those of the gods, it ground very slowly; so he had to abandon it.

Up to the time I went to Huntingdon I had not seen much of life; I had always worked, and worked very steadily; I had never seen any fights between men, had never seen any drunkenness, and had never been inside of a drinking-place. The kind of life led by the people of Huntingdon was quite new to me, but after I had become used to it I found it very interesting.

I had not been long in Huntingdon before a county fair was held in the town, when in and about the hotel every one was drunk, and there was much fighting and bloodshed. Like the good boy that I was at the time, I remonstrated with the fighters. I tried to reason with them, showing them how wrong it was on highly moral grounds; but I very soon found that they had no interest in the State of Maine

morality that I was trying to impress upon them, and one old fellow actually wanted to lick me for interfering, but I refused to fight, which I have always thought was a mistake. I afterwards learned that he was a great bully, and a good thrashing would have done him a lot of good.

One evening while I was walking along the street I saw a very dilapidated specimen of humanity limping laboriously along the sidewalk on the other side. His pace was slow and painful, and he was much bent. As he approached three youths about seventeen years of age, they all set about him at once, hustled him, knocked him about, and abused him generally. He begged of them to let him alone, but they persisted in their persecution. When they had satisfied themselves, they allowed him to pass on. The sight of this made my blood boil, so I walked up the street, crossed over, pulled my coat up on my back and my soft hat over my eyes, and took up the old man's painful limp. As I approached the youths, who were still skylarking, they shouted, " Here's another of the same kind," and they were soon about me, treating me exactly as they had the old man. I straightened myself up quickly, gave three blows in about two seconds, and the three big boys were laid out on the sidewalk. This was the first time in my life that I had ever struck anybody without having on boxing gloves. I told the young fellows that I had seen them abuse the poor cripple, and that I had punished them for it.

I decorated the sewing-machines and painted a good many signs while in Huntingdon, but I was always looking for something to do that would enable me to make a little more money. On one occasion a man had several thousand wooden kitchen chairs that he wished to have painted, and he was willing to pay six cents a piece to have it properly done. I accepted his offer, and everybody said I had taken

it much too cheap. However, I finished the job so quickly that the owner of the chairs thought that he was paying me altogether too much.

I did not remain long at Milne's Hotel but changed to Brackett's, which was a much better place, and while I was there, I got a great reputation for pencil drawings. I remember one night about twelve o'clock, two men, whom I had never seen before, came into my room with paper and pencil, waked me up, and demanded that I should make some drawings for them. I consented, sat up in bed, and did the drawings, with which they were quite satisfied.

About ten miles from Huntingdon there lived a very quiet farmer who always kept whiskey in his house. One day one of his neighbours called in and asked for a pint of whiskey, saying that he wanted it for his wife, but didn't want the trouble of going to the public-house, which was a long distance away. The farmer reluctantly let him have the whiskey, but refused to take pay. However, the man on departing laid down the money and the farmer kept it. This was a trap ; the fine for selling alcoholic drinks without a licence was, I think, one hundred dollars, and if I remember rightly half of it went to the informer. The farmer, who was poor, was very much upset, and did not know what to do. However, there lived in the vicinity an American, and at that time it was usual, if there were any Americans about, to consult them as we consult a solicitor in England. The American told the man not to worry about it : the matter could be fixed up all right. He then began to cultivate the acquaintance of the informer, and just before the case was to be called at Huntingdon, he met him and said he would take him down in his sleigh if he liked. The informer was only too glad to accept the invitation. There were many drinking places on the road, and when they

arrived in Huntingdon the informer was dead drunk. They put him away in a corner, and when the case was called there was no one to respond and the charge was withdrawn. Things were very hilarious in Huntingdon that night, and some malicious person cut off one of the lobes of the informer's ears.

Brackett's Hotel was a very lively place. Among the boarders was a young theological student, who was attending the seminary for the purpose of becoming a preacher. Some of the boisterous young men who frequented the hotel went out to the stables one night, brought out a calf that was about one month old, took it upstairs and put it in the parson's room. Later on the parson went upstairs with a candle in one hand and a book in the other, trying to repeat something in the book without looking at it. When he opened the door of his room the calf gave a loud *baa*, and rushed out of the room; and calf, parson, book, candlestick, and all tumbled down the stairs together, making a terrible rumpus.

The landlord's father-in-law soon put in an appearance and asked, "What's up?"

He was told that the calf was in the minister's room.

"What, a calf in the minister's room? Very much out of place," was his only reply.

I think Mr. Brackett, the proprietor of the hotel, took a fancy to me. His wife was an American and very much of a lady for those parts. An English gentleman who visited the place told her that the young countryman of hers was the only gentleman staying in the hotel.

Mr. and Mrs. Brackett wished to visit some friends in a distant town, which would necessitate their being absent a whole week, and they asked me if I would take charge of the hotel and act as bar-keeper. As they had been very

nice to me, I consented. Mr. Brackett said he had selected me because he believed I was a thoroughly honest young man, and as I didn't drink, I would not be apt to get drunk. He took me into the bar and explained things to me, showing me how I could tell one liquor from another by the smell; but as I had never tasted any of them in my life, his lecture was of little use, and so I got some sticky paper and labelled the bottles "Scotch Whiskey," "Irish Whiskey," "Gin," etc. He told me that the principal liquor consumed was called "high wines," which was practically whiskey of double strength, and that this was kept in very large casks in the cellar; all that was necessary was to mix a gallon of "high wines" with a gallon of water, when we should have the brand of whiskey most in demand. I made up some of it myself so as to understand exactly how to do it, and he actually left the place in my charge. I had a chance to think of the matter over-night, and I saw no reason why I should not be a first-class bar-keeper. I certainly was very well qualified as a "chucker out," but fortunately I did not have any of this to do.

It occurred to me during the night that selling the same kind of whiskey all the time to all kinds of customers in all degrees of inebriety was not exactly the thing; it was like a landscape all in a flat grey tint. Why not have some variation? Why should the whiskey always be of the same strength? I therefore decided on a new departure; I would make my whiskey to suit my customers.

The first day came and I sold the common stuff over the counter all day. Nothing happened, but at night the usual crowd came in. I knew nearly every one of the customers, and knew the ones best qualified to start the ball rolling; so when these gentlemen called for whiskey with a little water in it, I allowed them to turn their whiskey out of the

bottle themselves and handed them a little water jug, which contained "high wines" instead of water. They did not seem to notice very much the increased strength, but remarked occasionally that it was an exceptionally good brand of whiskey. As it was twice the usual strength, they were soon ready for business, and the fun commenced. As the evening wore on I dealt to the ordinary customers, who were well under the influence, a liquor which was only half the strength of that usually sold; this was a good thing for the house and a good thing for them. Everyone was getting very merry and the noise caused a lot of others to come in from the street, until the bar-room was full of drunken men, tobacco-smoke, and noise.

It was not long before a fight commenced; this was exactly what I wanted, and when it came time to shut up I congratulated myself on having done a very good day's business. I had taken a good deal more than the usual amount of money, and as I had treated others several times myself near the end of the evening, when they were all drunk, with a diluted form of whiskey, it may be imagined that the next night I had plenty of customers. Everybody said that Brackett had left town, that the American artist had turned bar-keeper, that there was a lot of fun, and that the young man had treated the crowd several times during the evening.

The next night was the same, singing and fighting, noise, bloodshed, and smoking. So things went on; I had a crowded house every night; dealt out diluted whiskey when it suited me to do so; got the principal actors and fighting men drunk early in the evening; and so made things generally interesting to my customers. It was a great success; nobody found any fault except the other hotels, who had lost temporarily some of their best customers.

When Mr. Brackett returned I turned over to him a lot of money, mostly in twenty-five cent silver-pieces, and then took account of stock. He said that I had done remarkably well, and that the quantity of liquor I had sold was decidedly small, taking into consideration the amount of cash I had taken. He suggested that I should continue to act as his barman—in fact, that I should become his partner. I admitted that I had had an immense amount of fun out of it, but I declined his too generous offer.

Huntingdon was a particularly lively place in those days. It was just at the beginning of the American Civil War. There were three in our family who were suitable to serve as soldiers and two of them, Henry and Leander, enlisted. My mother and my sister objected very strongly to my enlisting, and as it was the law that only two could be taken out of a family of three, I was exempt.

At that time some people expected that Canada might be involved in the war, and several regiments of British soldiers were sent out. One day it was announced in the newspapers and also on placards posted about the town that two officers in Her Majesty's Service would visit Huntingdon on a certain day for the purpose of purchasing horses for the cavalry and artillery. Everyone was very much interested and looked forward to the day. Finally, two officers arrived a day earlier than the one advertised; but instead of going into the dining-room of the hotel with the others, they hired the best room in the house, had their meals served in their room, carried their heads very high, and did not associate with anyone. They were the conventional type of young officers of that day, and quite a curiosity to the Canadians.

On the appointed day and at the appointed time Huntingdon was full of horses, from the little Canadian

pony with hairy legs, to the tall horses of the American type.

The two distinguished visitors, who spoke with a peculiar drawl that was decidedly new in those parts and wore kid gloves and eye-glasses, examined the horses and decided that not one in the lot was fit for Her Majesty's Service. They said they were the weediest lot of brutes they had ever seen ; and no doubt they were correct in this respect, for certainly I had never seen anything like them before in my life. Everyone was disgusted and the men that had horses were disappointed and furious. They had planned a glorious time for the night as soon as they had received their money. There was some talk of riding the two Englishmen on a rail as I had seen them serve another unpopular chap.

Suddenly a change came over the scene ; gloom, despondency, anger, and despair passed away and everyone seemed to be very jolly indeed. At first I could not imagine what had taken place. Early in the morning I had seen a quiet little American gentleman dressed in simple grey ; he was moving about among the horses without saying a word, but it seems that he had his pockets full of money, for as soon as the English officers had refused the horses he and his assistants actually purchased some hundreds, had them strung together on a long rope, and marched them to the other side of the line, where they very soon entered the American Service.

I had already seen some very lively times in Canada, but nothing like the night that followed the sale of the horses. Everybody seemed to have plenty of money and soon nearly everyone was screamingly drunk, so that by ten o'clock at night, drunken men were stored away in every hole and corner of the hotel. There was not so much fighting as usual ; they were too drunk to fight.

The people of Huntingdon were nearly all Scotch or of Scotch descent, with a fair sprinkling of North of Ireland Irish who were Orangemen. They wanted a flag painted with King William crossing the Boyne. It was a very large one and had to be painted on both sides. As I was the only one considered an artist and a painter, I got the job, and did it very much to their satisfaction, for which I was paid fifteen dollars in cash.

CHAPTER V

SHORTLY after, a French Canadian who had a carriage shop at St. Jean Chrisostome wished to employ me to paint and decorate his carriages. I accepted his offer, and half of the fun of my lifetime was enjoyed in that little out-of-the-way village. It was a very lively place. The people were very nearly all French, with a few Roman Catholic Irish; but four miles out there was a colony of Orangemen, who I think were about the best fighters in the world.

I lived at McGill's Hotel, McGill being the magistrate of the place, and the very first night I was there he played a trick on me. The next day there was a great flood; the snows were melting and the river had overflown the land. I got my feet wet and went to my room to change my boots, but found they were not there. McGill having but one pair of boots to his name, and those being very wet, managed to squeeze his big feet into my best boots and went out into the mud and snow. I was disgusted, for the boots were ruined.

The first Sunday I was in Chrisostome I walked one mile out of town to attend the English Church; I wished to see what the service was like. The clay roads were dreadfully muddy, and everyone walked on the grass at the side of the road where there were no fences. The next day, wishing to consult a Scotch doctor who lived near the church regarding smallpox, which was prevalent, I walked over the road

again. On returning, just as I entered the village, I heard someone behind me shouting loudly, and soon saw an old man without any hat, and of very fierce aspect, yelling at me at the top of his voice and shaking his fist. He called me a "d—— French Canuck."

It was all about my walking on his grass. I made no answer, but simply whistled, whereupon he rushed after me, but by that time I was on the solid plank side-walk. He was a large, tall man, and came at me like a veritable hurricane, aiming many blows at my face, none of which took effect. I knocked his arms away with my left arm, and putting my fist right up to his nose, said: "You see I could knock your head off if I felt like it, and I will if you don't behave yourself; your white hairs will not save you."

He drew back and said, "You're a d—— prize-fighter, a pugilist; anyone can see that."

I replied that I was not a prize-fighter, but that I knew how to take care of my own face. "You called me a French Canuck; I am a red-hot Yankee." There was a stone weighing about a pound lying near the side-walk, and he made a rush for it. I pushed him aside and took it myself and said, "If there is to be any stone-throwing, there'll be two in the game."[1]

He suddenly turned and ran for his house at full speed. A pretty young lady put her head out of the window and shouted, "Young man, run for your life; he is after the gun." But I didn't run.

Afterwards I learned that the girl managed to get the

[1] During the two and a half years that I was roughing it in Northern New York and Canada I saw many fights and was in some of them myself, but this was the only instance that any attempt was made to use sticks, stones, or arms of any kind. Fighting was purely a game of fisticuffs, no kicking being allowed, and what is more the man that got the worst of it harboured no grudge against the man who had beaten him at the game.

gun ahead of her father and dropped it down the cesspool, so the old man had to content himself with an old flint-lock pistol, of formidable size.

But I didn't run away, I waited for him. When he had come within twenty feet, he aimed the pistol at my head, but I laughed at him and said, " Fire away, old man ; the idea of trying to frighten me with an old flint-lock pistol that isn't loaded ! "

He then seized the pistol by the muzzle and attempted to hit me on the head with the breech-end, but I raised the stone, which I had kept in my possession, and we faced each other for a time.

Finally he said, " Come on, I am going down to see the magistrate, McGill, and give you in charge." So we walked down together, I keeping possession of the stone and he of the pistol ; but just before we reached McGill's Hotel the old man put the pistol in one of his coat-pockets. It was rather too large for the pocket, and the muzzle of it projected.

We went in and faced the magistrate, and the old man proceeded to make his complaint. It was rather serious. He said, " This young man has been walking on my grass ; he has trespassed on my property, and has threatened my life. As you see, he has a big stone in his hand now, and I wish to give him in charge."

McGill evidently knew his man, for he gave me a sly wink which reassured me, and said, " Young man, what have *you* got to say for yourself ? "

I told the magistrate exactly what had happened, and that the old man had pointed a pistol at me and snapped it. Whereupon I grabbed the pistol out of the old man's pocket, and showed it to McGill.

McGill laughed and said, " Mr. Charlton, I should advise

you strongly to drop this job, as your offence is much more serious than his. You had better ask his pardon and go home."

However, he did not ask my pardon, but left very suddenly.

McGill then told me all about him. "This man Charlton," he explained, "has some kind of an official position under the Crown. He has to look after the public lands, and prevent the timber from being cut off by those who will not pay for it. He has had many fights with French Canadians, and while in the execution of his duties he has shot and killed two of them. He has also killed a great number of the neighbours' dogs. Altogether he is a dangerous man."

The affair was the talk of the town for about three weeks. Many praised the wisdom and forethought of the girl who dropped the old man's gun down the cesspool.

My work at Chrisostome was nearly all decorative painting, striping carriages, etc. One day I saw a lame man about thirty years of age being abused by a very much larger man; they were both Canadian French. I interfered and rescued the man who was being assaulted, taking him into the shop for protection. This was at noon. During the whole of the afternoon the bully stood on the opposite side of the street, shouting, shaking his fist, and telling everybody what he was going to do to the d——d Yankee when he came out. I was told that this particular bully could lick all the Frenchmen in the village, but that there was another Frenchman living about a mile out that could lick him.

When the day's work was finished, while someone was engaging the bully in conversation I rushed out, got on to the side-walk and walked up behind him. The French Canadians have a strong sense of humour, and anything

that is comical amuses them immensely. I walked up very close to the bully, in fact until I almost touched him, and as he walked about I walked lock-step with him. This caused everyone to laugh. Finally someone said something to him in French, and he turned his head suddenly round and saw my face within six inches of his. He was simply amazed. Here was the man he had been wanting to lick for five solid hours. He didn't speak, but I did :

" You have been standing here for five hours shaking your fist at me, threatening me and telling the bystanders what you were going to do to the Yankee when he came out, and here I am. I am going home to my supper now, and I have no doubt that as soon as I am out of sight you will again commence to repeat your threats, but don't forget that I have friends here who will tell me every word you say, and if I find that you have said anything about me I shall not spare you, but will give you the worst licking you ever had in your life I will do it very quickly too, and don't you forget it."

When I returned from supper he came to me, and assured me that he had not said a word ; so the whole affair was finished.

All along the frontier between Canada and the United States everyone knew whom he could lick and who could lick him, and people began to discuss what place I held among the fighters.

One night there was a dance at McGill's Hotel when the French farmer who lived a mile from the village and who was the only one who could lick the village bully put in an appearance. It was a warm summer evening. He took up a position in front of the hotel, and issued a challenge in professional terms which were well understood in those parts :

"I can lick any d——d Englishman, Irishman, Scotchman, or Yankee in this town, and if you don't believe it just come out and try it on." This was finished up with a shout something like an Indian warwhoop.

At that time I had three friends, all young men. One was a Scotchman by the name of Alec Macdonald, about twenty-five years of age but rather small in size. He was up to every kind of devilry that one could think of. Another was a very small German about the same age, who was an agent for musical instruments. The third was an Englishman, about thirty years of age, but partially paralysed on one side. We were all together that night, and Macdonald asked if it were not possible to have a little fun out of the fighting Frenchman.

"Very well," I said; "follow me and lend a hand."

I approached the Frenchman as though I were going to fight him. He naturally thought I had accepted his challenge and prepared for action. Instead, however, of striking him, I gave him what is known as the Irish hoist[1]—I threw him over my hip. Being a big and heavy man, he came down very heavily on his back. It seemed nearly to paralyse him, and instantly my three assistants lent a hand. We drew him up to the side-walk, where I held his head and shoulders. The Englishman held one arm, the German held the other, and Macdonald ran into his shop and got a quantity of pulverized indigo, which he rubbed thoroughly into the bully's face. He seemed to be satisfied and went home.

About a week later, one noon, I was in the store where Alec Macdonald was employed, when who should approach but the fighting man who had had the dose of indigo. He recognized Alec Macdonald at once by his red head, and said

[1] Cross buttock.

to him, "Come out here, you little red-headed devil, and I'll break every bone in your body."

He did not recognize me at first, so I said, "Why not take the biggest one first? After you have licked me it will be a very easy matter to lick the other three."

The Frenchman put up his fists and made a rush at me, only to receive a powerful blow in the face which he didn't like. He stepped back and felt his face to see what had happened. He stood about twelve feet away. I knew he was preparing to make a rush, and I was ready for him. I met him half-way, also on the rush, and gave him a blow straight out from the shoulder with a very stiff arm. It took him on the cheek-bone and laid the cheek open for a considerable distance. The blood simply poured out, and he at once commenced to cry, saying, "You've licked me now." And that was the end of the fight. Dr. Livingstone, who was present, said it was the neatest little fight and the quickest over he had ever seen.

It was soon the talk of the town, and my reputation spread. Now it so happened that there was an Irishman by the name of Ned Lynch, living four miles out of the town, who had licked the two French fighting men already referred to as well as several others of less repute, and he claimed to be the champion fighter for that part of the country. Someone told him that his reputation was at stake, as there was a young Yankee in the village who had settled the best French fighting man with a single blow. Lynch didn't like this, so he thought the best way would be to come up to the village and straighten matters out. If he were not the champion he would just like to know the reason why. So he harnessed his old horse into a farm wagon and drove up. Fastening the horse to a tree, he proceeded to fire up for the occasion. Hearing a noise in the street, I looked out

and saw a man of very fierce aspect with a long black beard. His shirt was unbuttoned, exposing a broad and hairy chest; his sleeves were rolled up to display his muscles and his black hairy arms; his trousers were inside of his boot-legs; and he was walking in the middle of the road instead of on the side-walk, swinging his arms and shouting the conventional challenge in those parts, i.e. that he could lick any man quite irrespective of nationality.

The three leading men in the town were Mr. Stewart, who had a large store, Mr. Ross, who had a small store (both Scotchmen), and Dr. Garnon, an Irish physician and a very learned man for the locality. It seems that these three men had met to talk over the Lynch matter, and Dr. Garnon as a committee of one came to see me on the subject. He said, "These country bullies stand no show at all when matched against a skilful boxer. This was witnessed by the ease with which you knocked out the French bully. Ned Lynch is not so large a man as the Frenchman, but he is an Irishman, very fierce, and a good fighter, but he'd stand no chance against you; therefore, we want you to come out to-night at eight o'clock and give him a lesson. He has come up to town to-day for the sole purpose of thrashing you, so we all wish that you would give him the opportunity, and teach him better manners."

I remonstrated and said I did not wish to masquerade as a fighting man. It would certainly be very undignified for me to go out into the street and have a stand-up fight with a half-drunken Irish bully. But the doctor persisted, and at last I consented.

A French Canadian who was employed as a wood-worker in the carriage shop was very fond of calling on me at the hotel. He was engaged to a nice young Canadian girl, whose father was in a much better position than himself,

and he was always extremely anxious to put in a good appearance. At that time young men used highly perfumed hair-oil, and this Frenchman used so much for the sake of the perfume that his hair was actually dripping. He evidently liked my American brand much better than his own, so whenever he was going to visit his girl and take her out for an evening walk, he used to go into my room for a supply of the precious oil out of my bottle. Seeing that it was disappearing very fast, it occurred to me that I might play a joke on him. Having read in some American scientific paper how a luminous hair-oil could be made, I succeeded in getting a piece of phosphorus from a man who had been experimenting on matches. It was about the size of a bean, and I kept it in a bottle of water. With this I made the luminous hair-oil, which I placed in my bottle, from which he supplied himself as usual.

It was a dark night, and when he took his girl out for a walk on one of the quiet lanes she noticed something peculiar about his hair. She took off his hat and, lo and behold! his whole head was luminous and seemed to be surrounded by an incipient halo. Both were devout Roman Catholics and extremely superstitious; it appeared to the young lady that her lover was on the road to becoming a saint, as he had a distinct halo around his head. Phosphorus gives off luminous fumes in the dark. The experiment was a great success.

Although I had promised that I would attend to Mr. Ned Lynch at eight o'clock in the evening, I didn't seem to like the idea of having a real stand-up fight with the fellow. I thought of the poor Frenchman whom I had struck, of the blood running down over his face and clothing, of his piteous look and of his crying like a baby; and I felt it would have been better if I had not struck him so hard,

but had thrown him on to his back. It then occurred to me that I might play the hair-oil trick on Ned Lynch. He had a regular forest of black whiskers fully twenty inches long. But I wanted to make the mixture a little stronger ; so I put in another bit of phosphorus, and after melting it over the chimney of a lamp, I shook the bottle very violently until the phosphorus had mixed with the oil, and cooled. The little phosphorus that was not dissolved was in minute globules about the size of a pin's point.

At eight o'clock promptly I walked up to Stewart's store ; there was a large open space in front. It was a very warm, dark night, and the streets were not lighted. The only light was that which escaped through Stewart's windows from a few kerosene lamps of small size and from a few candles. I found about one hundred men and boys waiting to see the fun. I think they all sympathized with me and expected to see an expert American boxer knock out a very objectionable bully.

Someone whispered to Lynch that Maxim was present, and pointing to me, said, " It is that big fellow over there in a light-coloured coat," whereupon Lynch rolled his sleeves up a little higher, marched out into the centre of the square, and issued the conventional challenge in a loud voice.

I accepted the challenge, and walking up to him with the little bottle in my right hand, made a feint with my left hand ; and while he was warding off an expected blow, which he had every reason to believe would be a very dangerous one, I saturated his whiskers with the oil. No sooner was the oil on his whiskers than a great cloud of luminous vapours rose high in the air. In the dark he actually appeared to be on fire.

I stepped back to enjoy the fun. In attempting to

smother the imaginary fire in his whiskers his hands appeared to take fire.

Everyone was amazed. Some of the superstitious thought it was a judgment from heaven. A Frenchman ran up to him and said, "Mon Dieu! Mon Dieu!" and attempted to smother his whiskers, but one blow from Lynch's powerful hand landed the Frenchman flat in the street, and set his back on fire—not real fire, however. After about five minutes a considerable number of the bystanders came to Lynch's assistance. They took him to the mill-pond near by, the water of which was nearly on a level with the street, and sunk him, that is, they gave him complete immersion, which, of course, extinguished the supposed fire. When he came out of the water he was thoroughly sober, with all of the fight knocked out of him, but he had not been long out when again a large cloud of luminous smoke rose high in the air. By that time they seemed to have got the oil all over him, while a good many of the Frenchmen had some of it on their hands. They had no trouble in extinguishing it by putting their hands under water, but no sooner were their hands out of water again than they gave off a luminous smoke.

I thought at first I had overdone it, but subsequent events showed that I had not.

Ned Lynch was so upset that he forgot all about his old horse and walked home four miles. The next morning his wife walked up to the village, found the horse and wagon and drove back home.

Everyone congratulated me for the beautiful exhibition that I had given them.[1]

[1] If any of my young readers should wish to make luminous hair-oil it is only necessary to take any kind of ordinary hair-oil, drop into it a piece of phosphorus the size of a small pea, and then heat it over the flame of a lamp until the phosphorus is melted and the oil warm. By

As far as I can remember I had no other fights in Chrisostome.

Dr. Livingstone, who lived near the Episcopal Church about one mile out, had three pretty daughters, and one beautiful summer evening my three friends suggested that we should walk out to the doctor's and see if we couldn't get a peep at the girls. Before arriving, however, we found the doctor, his hired man, and the three girls all armed with clubs attempting to get a three-parts-grown bull, that belonged to one of his neighbours, out of his pasture. As we approached the young ladies ran home. It was then suggested that the four of us should assist, but I hinted that they should leave the bull to me and I would see what I could do alone. The bull, having been pursued with clubs, was in a great state of excitement, but soon cooled down and commenced to eat grass. I got over the fence very cautiously and approached the bull with nothing but my bare hands. The bull looked at me and gave a snort. I then sat down and commenced to pull the grass up with my fingers. The ground had never been ploughed, and consequently, was all hills and hollows known locally as cradle-knolls, which are not very favourable for speed either for horses or cattle. Without rising from the ground I gradually worked myself along in the direction of the bull, never looking at him when he was looking at me. He kept on feeding until I had got within twenty yards of him. I then made a dash for him, and before he could get up

shaking the bottle violently the oil will dissolve a portion of the phosphorus. It should then be set aside and allowed to settle, when the oil should be decanted off leaving the undissolved phosphorus at the bottom of the bottle. Hair-oil made in this way is fairly luminous in the dark, but if you wish to make a brilliant exhibition it is necessary to add a small quantity of carbon bisulphide. The oil may be made of any strength by the use of this chemical, and care should be taken not to use too much phosphorus.

speed I had him by the tail, and taking advantage of the cradle-knolls I made it very difficult for him to run fast, by pulling his hind-quarters down the hills, so that sometimes he would be heading up the little hills instead of down. After this had been going on for some time the bull seemed to think the matter over, and stopped and kicked. A horse kicks out quickly with great violence and withdraws his foot at once ; but the bovine species do not withdraw their foot unless it hits something ; they keep vibrating it for a second or so. While this vibration was going on, I let go of his tail and caught hold of his foot, raised it about six feet in the air, and down went the bull. Before he could recover himself I had the thumb of my right hand up one of his nostrils and three of my fingers up the other. I caught him by the horns, twisted his neck so that he could not get up, and held him there until they obtained a long and strong rope. They tied the middle of this around his horns with several men on each side. When, however, I allowed him to get up, he ran away with the lot of them until I caught him again by the tail and got him out of the field.

When the job was finished the doctor said, " If I had been told that anyone could go into a field with a bull of that size, with nothing but his bare hands, throw him down and hold him, I would not have believed it, no matter who had told me. It is the greatest feat of strength that I have ever witnessed."

There was boarding at McGill's Hotel at that time a real old typical English schoolmaster. He looked as if he might have been cut out of Dickens. He always wore a blue coat with brass buttons, a tall silk hat and gold-rimmed spectacles, He was of a very surly and combative disposition, finding fault with everything, nothing being good enough for him.

The fact was he was not used to that kind of rough life. The people in the hotel named him " Old Vinegar."

One beautiful Sunday afternoon, while walking along the banks of the river looking for snakes and frogs, I discovered a frog which was at least six times as large as the French frogs, and more than three times as large as any I had ever seen before. Stepping up very slowly, I succeeded in capturing him, took him back to the hotel, and emptying out about half the water from Old Vinegar's water-jug, I replaced it with the frog, which was quite unable to get out. The old man heard noises in the night that he couldn't account for, and in the morning, when he went to turn out some water, the frog managed to flop out into his basin, made a jump, and landed on the floor, secreting himself under the bed. Old Vinegar dressed without washing and went rapidly downstairs to tell Mr. McGill what had happened. I heard the conversation. He said he had found a frog about the size of a cat in his water-jug ; that it had flopped out and was now under the bed. Somebody must have put it in for a joke, and he strongly objected.

McGill, of course, knew it was a trick, but he attempted to explain to the teacher that it might have been all accidental, that the servant in getting the water might have carelessly bailed up a frog. But Vinegar was of the opinion that she could not have bailed up such a large frog without seeing it. McGill attempted to satisfy him by saying that frogs grew very quickly and that it might have been just a little speck and had grown during the night. But it was no use, Old Vinegar refused to listen to such an explanation, and the frog was caught and returned to the river.

Mr. McGill had a daughter about fourteen years of age with the reddest kind of red hair, the bluest of eyes and the finest collection of freckles that I have ever seen. She was

clever and witty for her age, a wonderfully talented pupil at school, and chock-full of mischief. On one occasion she dressed up in Old Vinegar's Sunday-go-to-meeting suit, but unfortunately met Old Vinegar on the stairs, and there was a great row.

One day the hotel cat caught a mouse; I managed to wheedle it from her and gave it to Shorty, as the girl was called. She put it in Vinegar's water-jug, but his experience with the frog made him look before he turned out the water. On seeing the mouse he dressed rapidly and ran downstairs to find Mr. McGill. He was furious. He said he had found a mouse in his water-jug, and he wanted Mr. McGill to come up and see it.

Mr. McGill said, "Oh, the poor little thing; he must have climbed up there in the night to get a drink and got drowned. What a shame!"

But Old Vinegar insisted; he actually caught hold of McGill and led him upstairs into his room, and then pointing his finger into the jug said, "There you are, see for yourself!"

McGill looked and saw no mouse—Shorty had removed it. He then returned to his office, only to be followed by Vinegar, who protested that there *was* a mouse in his jug.

"Yes, an imaginary mouse—you should stop drinking," was McGill's reply.

But Old Vinegar declared that he had seen a mouse there, that it was not imagination at all. After a good deal of grumbling he returned to his room, when, lo and behold! there was the mouse again. He ran down to McGill and forced him up once more, saying, "The mouse is there after all, there is no imagination about it." On entering his room he said, "There you are, look for yourself," but there was no mouse in the jug.

This gave McGill his opportunity. "You really must stop drinking," he said. "I have no doubt that you actually believe you saw a mouse in your water-jug, but there is no mouse there. If you don't stop you will be seeing snakes in your boots; you had better stop before it is too late."

But the teacher was not satisfied. He again followed McGill half-way down the stairs, and then reluctantly went back to his room; and when he attempted to turn some water out of the jug a mouse came out with it. It was no use, McGill would not return to the room again, he only delivered another temperance lecture.

The school-house was a very small affair, and the scholars were very much given to looking out of the windows. The blackboard had been repainted by a local painter, and was so soft and gummy that it could not be used. Old Vinegar was very anxious to have the lower panes of the windows frosted and the blackboard put in a condition to be used. I was approached on the subject and assured them that I could do the job to their complete satisfaction. There was a short vacation, and I went to work. I frosted all the lower panes very quickly, and then drew some fine lines by way of ornamentation, just as they did in the States. I thought over the subject of the blackboard; I never had painted one, and it occurred to me that I might do something quite original. I scraped off the soft and gummy paint and rubbed the board down with a very coarse sandpaper. I then mixed up a paint that was largely made up of flower of pumice and fine emery, but with sufficient lamp-black to give it a dark colour. This was mixed with a liquid which is used in America as a dryer for paints, and if used by itself it dries quickly and is very hard. I added a little quick-drying varnish with some turpentine, and painted

the blackboard with this mixture. I gave each coat two days to dry, and at the end of a week it was as hard as a brick. I then told the three head men, Stewart, Ross, and Dr. Garnon, that the job was finished, and we all met at the school-house in the evening. The old English teacher was also present, and he said I had made a beautiful job of the windows, the best he had ever seen. I then delivered a little speech, saying: "Gentlemen, I think I have done something quite new in the way of a blackboard. I am giving you one with a much harder surface than you have ever seen before. It is as hard as a slate." I then wrote on the board with a slate pencil; the others came forward and found that they could really write on it with a slate pencil just as if it were a slate, and that the writing could be removed in the same manner. I had really made the first silicated blackboard that was ever made in the world, and the old schoolmaster complimented me highly.

I then presented my bill. I think that I charged about six dollars for the job, or say twenty-four shillings. Stewart was on his feet at once. He protested against such a preposterous bill. He went on to say that the materials that I had used would not cost over twenty-five cents; that he had a very good man working on his farm to whom he only paid four dollars a month, or a dollar a week, that the work I did was nothing like so laborious as that on a farm; that certainly I could not have taken more than a week to do the job; and therefore he thought one dollar and a quarter —five shillings—quite ample. Mr. Ross agreed with him.

Then came Dr. Garnon's turn. He was a very able man. He said that I had done a job that no one in the place could do, something unique and very valuable, that I asked the exceedingly moderate price of six dollars for the job, and that now they wished to cut my price down to one dollar

and a quarter, putting my skilful work on a level with that of a farm labourer. He said that I was the kind of man that was required in Canada, if they wished to compete with the States, and he strongly protested against such treatment. But they were obdurate and would not agree to anything more than one dollar and a quarter, which happened to be the exact price I had paid for the materials I had used. A few years later someone in the States commenced to make the same kind of blackboard. It was a very important invention, and many thousands were sold all over the States and in Canada. This was indeed the first valuable invention that I made, but I did not appreciate it at the time.

A few days after this I left Canada for Brasher's Falls, New York. Afterwards, as my name became known in the world, I got letters from Dr. Garnon recapitulating the events that took place in St. Jean Chrisostome, and the contemptible meanness of the two Scotchmen, who paid me one dollar and a quarter for the work in the school-house.

CHAPTER VI

ARRIVED at Brasher's Falls I went to the house of my old friend Samuel Ide, who was still in the employ of my cousins in the threshing machine factory. He had a beautiful wife, but no children. A niece was living with them, a very fine girl of seventeen; also the milliner of the village, a handsome young lady of twenty-two. At first we were rather a happy family, but I do not think that I was particularly interesting to these young ladies; I was too studious to please them, and spent too much time over books. During the winter I was there I read through Ure's *Dictionary of Arts, Mines, and Manufactures*. On the back of the book was printed in large letters "DICTIONARY," and it amused the girls very much to see me reading a dictionary. They asked me if it was interesting? Was there a murder?—What had become of the heavy villain?—Were they married?—Did they live happily ever afterwards? But this did not stop me; I simply devoured the book.

I found that there was a demand for a painter in this village. Many people wished to have their carriages repainted, and there was not a good sign-painter within forty miles. So I took a large room on the main street; it was an ideal shop. I first commenced to paint and decorate sleighs, and when the inhabitants discovered that they could have their old sleighs and carriages repainted, redecorated, and made to look better than ever, I had plenty of work. I also repainted their signs.

As it was necessary to ascend about half a dozen steps to get into my paint shop, it was sometimes rather difficult for me to pull in a heavy carriage without assistance. One day while I was struggling with a wagon that was a little too heavy for me, two Irishmen, evidently fresh from the old sod, came to my assistance, and the wagon was got in without further trouble. They then asked me if I had a "dhrop of anything to dhrink." I had never tasted any strong alcoholic drinks, but I had learned from my experience in Huntingdon that whiskey was a mixture of alcohol and water, about half and half. I had in the place a bottle of alcohol which I used for dissolving gum shellac. After thinking a minute, and wondering what effect the alcohol would have on my two assistants, I fetched the bottle and took my chances of having a fight. They turned out a quantity in a glass and one of them drank it. He didn't seem to find it extra strong, and gave the glass to the other, who also drank some. Neither of them showed the least sign of wishing to fight. They smacked their lips, and one said to the other: "Oi say, Moike, that's the rail stuff. Oi haven't seen anything loike it since Oi left the ould counthry." Of course, it went down their throats like a torchlight procession, and made me think of the Indian who said, "Me like alcohol, it make big drunk come quick."

About a fortnight later one of these Irishmen called and asked me if I would be kind enough to give him the address where he could get some of the same stuff. I then told him that it was alcohol that he had been drinking, and that it was about twice as strong as whiskey.

One day I heard that a man had a two-wheeled carriage —called in the States "a gig," and something like a racing sulky—that he would be willing to sell very cheap. I went down to the village loafing-ground in front of the store and

found quite a crowd looking at the sulky, which seemed to be perfectly sound, although the ironwork was rusty, and the woodwork had received only one coat of lead-colour paint. The man wanted ten dollars for it, but ultimately let me have it for five dollars. At that time I had a horse and a harness, but no carriage. I took the sulky into my shop, went at it vigorously with coarse sandpaper and gave it two coats of vermilion mixed with shellac varnish. Many things can be done with shellac in the dry air of America which are impossible in England. I then striped it with black, blackened all the irons and gave it a coat of shellac varnish. When finished I harnessed my horse into it, drove through the village and stopped on the loafing-ground. The loafers were astonished and wanted to know if it was the same old sulky that they had seen about a couple of hours before. I told them it was. They tested the paint to see if it was dry, and found it hard and shiny. I did this quick job for the purpose of astonishing the natives.

I asked Sam Ide not to mention that I had been considered a fighting man in Canada, as I didn't wish to have any more fights. He gave his word and kept it, and it was not until well along in the winter that it was discovered that I was an exceptionally strong man. I had more work than I could do in the daytime, so I used to work in the evenings, and the young men of the village would come in to see me at my work. One evening they were accompanied by a young man who was supposed to be an expert wrestler. Their object was to have a little fun at my expense. Of this I had not the remotest idea, until the wrestler clinched me and attempted to put me down. But instead of my going down as was expected, the wrestler went down himself, and very quickly too. He was not satisfied, and tried

it twice more with the same result ; no sooner did I put my hand on him than he was lying on the floor.

There was a good deal of the same spirit in Northern New York at that time as there was in Canada ; everyone was supposed to know his master as well as those whom he could master, somewhat like the chickens in a barnyard.

The flooring of the wrestler led to a good deal of talk and speculation. At that time there was a French Canadian living in the village by the name of Louis Hentz. He was only a moderate-sized man, but it appears that he was very quick and muscular and a desperate fighter. He had been up before the magistrate many times and fined for assault and battery. He was always looking for somebody to lick, and when he learned that I had thrown the wrestler he challenged me to fight him. I took not the least notice of his challenge. Whenever I passed him in the street he made some insulting remark and was telling everybody that I was afraid to fight. When I was spoken to on the subject I said : " I know nothing of Louis Hentz ; I have never spoken to him in my life, and never intend to." I knew very well that if I should whip Hentz they would very soon find a still bigger and stronger man, and so I paid no attention to the insults that I received.

So things went on until Independence Day, the 4th of July, when I took a young lady from the hotel to a ball. The next day at about three o'clock in the afternoon I went round to the hotel to call on the young lady. Hentz was in the bar-room with a lot of other men. They saw me coming, and as I opened the door of the hotel Hentz grabbed up a sheepskin mat that was full of dust and tobacco juice, and threw it fairly into my face. I had on a white vest and light trousers, both of which were badly befouled. Hentz stood before me with his fists in a fighting position, and

everybody held back to see the fun. I walked up to him and pretended that I was going to give him a powerful blow with my left fist; while he was looking out for it I gave him a tremendous blow with my right fist which laid him out flat on the floor. He did not get up at once, but he was game, and got up as soon as he could. The instant he showed fight he was down again. On the third round, as one might say, I gave him a very heavy blow. He went down and was quiet for some seconds, then he raised himself into a sitting posture on the floor, and as I stood over him I said: "You have been sending challenges to me for months; you have repeatedly made insulting remarks to me; you were spoiling for a fight, and now you've had it; I hope you are satisfied. But don't attempt to get up, for if you do I'll kill you." After keeping him there for about five minutes I went home, changed my clothes, and called on the young lady. Hentz's face was badly bruised. He took advantage of this and went to the various magistrates and attempted to have me summoned for assault and battery. He even went five miles out of the village for this purpose, but was told: "You are a fighting character, you have been summoned many times, and now that you have got thrashed yourself, you are not satisfied."

It may be imagined that the good drubbing I had given this contemptible bully was the talk of the town for several days. I fully expected that the notoriety I had thus obtained would be almost sure to bring another contestant for the honour (?) of being the champion fighter of the village. In discussing the subject with some of the villagers I was told that the greatest fighting man in the vicinity was old John Tester, who was an extremely large man and sixty years of age. He had been a celebrated boxer in the British Navy, and was living on a farm about five miles

from the village. On one occasion he had thrashed Louis Hentz himself. A few days after this old John Tester came up to the village for his groceries and to get a nip of something to drink. I saw him passing at about two o'clock in the afternoon with his old mare and wagon. I knew he would go to the drinking-place, and that the loafers would be certain to taunt him about his disappearing championship, and I thought perhaps he might come round to see how the land lay. About two hours later my door was darkened by a mountain of humanity, and sure enough there stood the man. He was very large and tall, florid and freckled, with red hair and a stubble of red whiskers all over his face. I noticed that his eyes were small and blue, and that he had immense yellow shaggy eyebrows. He appeared to be fully sixty years old, and I therefore imagined that large as he was he stood little or no chance of doing me much harm.

I had been half expecting him, so was quite ready, and had made up my mind to be studiously polite. I was working with my coat off, and he stood and looked at me for a few seconds. As he advanced I said in my mildest tones :

" Mr. Tester, is it not ? "

" Yes."

" It's a very fine day."

" Yes."

" The late rain will be good for the crops."

" Yes."

I asked him to step forward and see the highly coloured landscape that I had just painted, and explained that I was now painting some roses each side of it.

" Yes," was his only reply.

I saw that my kindly interest in him and my politeness

were having their effect, and as I went on telling him of my work I felt almost sure that he would not broach the subject of a fight—I would conquer him with kindness. He fidgeted about, evidently not knowing how to commence proceedings ; then standing up at his full height and looking down at me, he said : " You're a d——d good-looking little chap, anyway."

I replied that I wished he would try and impress that belief upon a certain young lady.

Suddenly, like a flash, he grabbed my left hand ; I attempted to snatch it away, and partially succeeded, but he had my finger-ends in his vice-like grip, and the bones seemed to squeak. However, I managed to release my hand, and two seconds later old John Tester had turned a somersault in the air, and landed on his back with a force that made everything rattle. As he went over he took one of my shirt-sleeves with him. I immediately grabbed him by the shoulders and dragged him outside and down the six steps. As he went out he caught hold of one of the doors and opened it the wrong way (outwards). In less than ten seconds from the time he grabbed my hand he was in the street on his back with my white shirt-sleeve in his hand. But this was not enough ; he was an old hand at the game and as plucky as a bulldog. He got up, and I mounted my steps determined to keep him outside. He charged at me again and again, only to receive severe punishment. Soon the blood was streaming from his mouth and nose ; I was making it very hot for him, and using all the swear words I could think of. Just at that moment I saw my sweetheart passing ; she gave me one withering look and never spoke to me again. Later on, however, I found a still prettier young lady in Boston, who knew a hundred times as much as she knew ; " having been born in Boston, there was, of

millwrights a "penstock." It was built up of long and thick pine staves held together by iron hoops. It was about twenty feet long and forty inches in diameter, only supported at the ends, and was well able to stand internal pressure. When I saw it, and before the water was let in, I told the millwright that he certainly ought to support it in the middle, otherwise the weight of the water would break it down. He laughed at me and criticized my cheek.

Like all country places, the local store was the evening loafing-place, and I often joined the crowd. It was not long before everyone knew that I had been attempting to teach an old and experienced millwright his own trade. I maintained that I was quite right, that I knew all of the mathematics connected with the subject, and that they would find out that what I said was true unless the penstock was supported. The millwright came round and we discussed the matter before the crowd. Everybody thought it was a good joke; I heard one man say: "Only hear the boy talk."

The millwright explained that the penstock being cylindrical the water would push up just as much as it would push down, so that the pressure would be perfectly balanced.

"But," I said, "certainly the water will weigh something, and the penstock will be much heavier when full than when it is empty. Then again, when it is only three-quarters full there will be a lot of pressure on the bottom side and none at all on the top; how about that?"

But everybody laughed. We did not, however, have long to wait, for a few days later the water was let in. The penstock commenced to sag at once, and soon broke in two and fell down. It was rebuilt and supported as I had suggested.

I then looked at the flume and found that it was very

deep and only about four feet thick in one direction and perhaps fourteen feet the other way. I told the millwright that it was not strong enough to sustain the pressure, but he said the pressure would be very slight, as the water to be supported would be only four feet thick, which was nothing.

I replied that the thickness was not a factor at all in the equation; it was a question of head, which was fourteen feet.

Being this time inclined to listen to me he put a few light iron bolts through the flume. I looked at it again and told him that the rods would either break or the nuts would be drawn through the wood; and sure enough they were. It was only when he made the flume much stronger, with large iron bolts and thick and heavy iron plates, that it stood the pressure.

The building where I had my paint shop was sold, and I had to leave it. I therefore disposed of my little business and went to work in the threshing machine factory.

Shortly after, I received a letter from the select men of Dexter asking me to return at their expense for the purpose of giving testimony in a lawsuit. It was then that I learned who had gone to war out of our little scout company and who had stayed at home.

CHAPTER VII

I HAD had enough of the wild and woolly West, or perhaps I should say of the North, which was quite woolly enough at that time, so I went to Fitchburg, Mass., where my Uncle Levi Stevens had some engineering works. He looked upon me as a perfect novice at first, and set me to work at a very low salary, cleaning brass castings. One day some white metal castings were to be made into patterns, and the head foundry-man gave the job to me. He said: "You are too good a man to work at cleaning castings, and the way to get out of it is to make a good job of these patterns." I knew all about how patterns should be made, and did make a good job. The man said that it was the best he had ever seen, and showed them to my uncle, who at once promoted me to a big lathe on rough cast-iron work. I got on all right, did as much as any journeyman had ever done, and did it as well.

While working this big lathe, I often had to go into the brass-finishers' shop to grind my tools, and I much admired the Fox lathes, they were so convenient and handy. The men who operated them were very expert indeed, and received a salary of two dollars fifty cents a day.

There was a very brisk demand for brass-work, such as globe and angle valves, brass cocks, steam whistles, etc. My uncle was in a great hurry for a lot of two-inch angle valves, when one of his men left and went to Boston. As

I had done everything he had given to me, he asked me if I thought I could work a Fox lathe. I told him I was sure I could do so, and was given a batch of eighty angle valves to make. I went at it and turned them out in exactly the same time that his best men would have required. The valves were very closely examined and pronounced to be first class in every respect. This, however, was the last job that I did on brass-work at the usual speed of the other workers.

The next job given to me was a hundred blow-off cocks for boilers, and I made these quicker and better than any other man had ever done before. I beat the other men because I put the reamer in better condition, and observed certain rules regarding turning the taper keys all at an exact and correct angle, so that very much less grinding was necessary.

But the shop was not big enough; the engine was too small. In order to get it to do its work the safety valve had to be loaded beyond the safety point, and so my uncle put up a larger building and bought a larger engine with two cylinders. While this engine was being put up he asked his foreman what the relative difference would be in the horse-power. This was in the evening after the day's work had been finished. The foreman said that he would figure it out after he went home and let him know in the morning, whereupon I ran over the figures quickly in my head, saying, "Circles are to each other as the squares of their diameter, etc.; the difference is as 25 is to 72: therefore if the old engine is 25 h.p. the new one will be 72, with the same steam pressure." I told them this, and they both turned on me and wanted to know how I had managed it. I explained the law relating to engines, and told them how simple it was. The foreman was disgusted, but my uncle was much pleased.

The new shop was to be decorated round under the eaves with a kind of an acorn-shaped ornament hanging down. There were to be many of them turned out of blocks of pine wood, 5 by 5 and 1 foot long. There being no suitable wood-turning lathe in the establishment, my uncle sent the blocks to the locomotive works, where they had a splendid lathe, and asked me if I thought I could do the job. I told him I was sure that I could; and while I was at it the locomotive superintendent came in and said:

"Young man, you seem to understand your work; you must have done a little wood-turning before this."

I told him that I had had my first lesson in wood-turning when I was seven years old, and that I had been at it occasionally ever since.

The next time he saw my uncle he said, "I have seen a little wood-turning in my life, but that nephew of yours beats anything I have ever seen. It is marvellous the rapidity with which he turns out the work."

I did not work long at the brass lathes. My uncle took a contract to make a number of Drake's automatic gas machines for a Boston Company, and asked me if I could dismantle the specimen machine that had been furnished and make working drawings of it. I assured him I could. I got together the necessary appliances in the afternoon, put up a drawing table, collected some very indifferent drawing instruments belonging to my uncle, and the next morning commenced the work.

My uncle was away in Boston the whole of the day and only returned late at night. The next morning on seeing what I had done he said, "You have done more work and done it better than any draughtsman in this town could have done."

I would say that in the meantime I had been studying

all the books I could find on the subject, and it was this knowledge that I had turned to account. My uncle soon obtained some better drawing instruments, and made for me a regular draughtsman's office in the new building, where I turned out numerous drawings in record time.

One very cold winter's day, while I was engaged on a drawing, the locomotive superintendent came in and inquired :

" Where is your uncle ? "

" He is in Boston to-day."

" Have you any copper tubes in the coppersmith shop that would do for locomotive boilers ? "

" No."

" Could your coppersmith make some for me ? "

" Unfortunately he is away on a drunk to-day."

" Is there anyone on the premises that can work copper ? "

" Yes, one, and that is myself."

" What ? Are you an expert brass-finisher, an accomplished wood-turner, a draughtsman, and a coppersmith ? "

I said that if there was any copper I could make the tubes. So we went down to the copper shop ; there was nothing there except the bottom of a very large sap kettle that my uncle had purchased for old copper. These sap kettles have a large flat copper bottom and wooden sides ; the kettle projects on every side a considerable distance beyond the furnace, so that the wood does not get burnt. We found that this kettle bottom was the right thickness. The dinner whistle then sounded, and I said I could make the tubes in the afternoon. The superintendent told me the size required and said that the locomotive had to go out at nine o'clock that night. I finished the job just before

the whistle blew at the end of the day, and the locomotive went out on time that evening.

It seems that all the painters in Fitchburg were very much addicted to getting drunk, especially those who were able to do striping or ornamental painting. On one occasion a well-known tool-maker wished to ship a lot of lathes. It was the fashion at that time to paint engines and lathes a deep olive green and stripe them with a peculiar shade of dark purple, with perhaps a few red stripes here and there. The lathes were painted but not striped, and the decorative painter was drunk. The tool-maker was complaining to my uncle very bitterly, when my uncle offered to help him out, saying, " My nephew can do almost anything ; I'll send him down, and he will do the striping." I did, and the tool-maker complimented me by saying, " It is a better job and you have done it quicker than the regular painter."

Not only were the Fitchburg painters much addicted to getting drunk, but the same was true of Boston painters. Putnam's Machine Works are at Fitchburg ; some of the finest engines and tools in the world are made there. The American Institute Fair at Boston takes place only once in four years, and on two occasions Putnam's had failed to get their big engine properly painted. On the occasion of the next fair, Putnam again supplied the big engine for running everything in the place. This time Putnam said there should be no mistake, so he employed the best-known painter in the place, who was a " grand worthy patriarch of the Sons of Temperance," sworn not to take a drop of alcoholic drink. The engine was ready for painting three weeks before the fair opened and the worthy patriarch was sent down to paint it. He was empowered to hire in Boston all the help he might require. About three days before the

opening of the fair, Mr. Putnam went to Boston to see how the engine looked. He found that it had only received two coats of lead colour. No one knew where to find the painter. Later on, however, he was found in a neighbouring grog shop. On seeing Mr. Putnam, he said, " Oh, she's all right, Mr. Putnam ; she'll be ready for the opening day." But Mr. Putnam refused to allow any more paint to be put on the engine as it could not possibly dry in time for the opening.

I visited the fair shortly after it was opened. I noticed that the light grey harmonized very well with the polished cast-iron and steel ; I liked it immensely, and thought it much better than the usual gaudy greens, purples, and reds. It had a certain chaste and elegant appearance peculiar to itself, and I was not the only one that noticed it.

At that time the Putnams were the standard tool-makers of Massachusetts and, as it were, set the fashion ; Massachusetts set the fashion for the rest of the United States, and from that day to this, machine tools and engines have been painted a dull lead colour instead of bright and shiny colours. Thus the fashion in tool painting was completely changed in the United States—and in England for that matter—by the simple fact that the " grand worthy Patriarch of the Fitchburg Sons of Temperance " got drunk and remained drunk for about two weeks.

These were glorious days. All my working hours were given to hard work and study. I left no stone unturned to become expert at everything I had to do. It was a very happy time, because I was fully employed and learning very fast, but the pay that I received was small. However, all things come to an end. My uncle hired a Boston man who was a spiritualist, and we had spiritual séances at my uncle's house, as well as at the Town Hall. All the mediums

used to call on us, but I took little or no interest in the matter—I was a mechanic, and nothing else.

We had not been making Drake's automatic gas machines many months when my uncle thought he could design a very much better one. He attempted it and made one, but it was a dead failure. I then asked him to allow me to design one ; he consented, and the machine worked all right. He at once went to work to have a lot of patterns made and lay out the shop for making a large number of them. A firm in New York had agreed to sell all that he could produce. The machine, though fairly effective, and as good as any other, was rather complicated and expensive to make, and as I studied the question, I found that by changing the design altogether I could greatly simplify it and reduce the cost of production ; moreover, by interposing a very powerful clock-spring between the driving gear and the pump, the pump would continue to run for a few minutes while the machine was being wound up.[1]

My uncle was a curious character, and had a peculiar temperament ; I did not dare to show him the new design, so I showed it to the foreman.

He said, " Yes, it is a great improvement on the other machines ; it is cheaper and altogether better, and has a much better appearance ; but now that your uncle has the patterns and material and has already commenced to produce, he will be simply furious if you show him the new

[1] In the first machine that I designed the gasoline and the water were in separate vessels, but in this new design both were in the same cylinder with only a brass partition between. As the quantity of water required for a wet meter wheel pump was very large, its temperature was not easily changed. The specific heat of gasoline is very low as compared with that of water, so the great volume of water was just what was required to prevent a sudden drop in the temperature of the evaporator. This, however, was a *nice* point that my uncle was unable to understand at the time.

design. However, you might submit it to the New York merchants, and if they like it better than the old one, your uncle will be sure to make it."

Between us, we concocted a letter and sent it to New York, but before we received a reply the foreman asked me to go to Boston and spend a week-end at his house. I took a drawing of the machine with me, and that evening we took it to the spiritual medium, who was not only his adviser, but the adviser of my uncle as well.

The medium examined the drawing bottom side up, and I found that he knew nothing of the subject. It was simply ridiculous; I felt greatly annoyed, and admit that I showed a little of my disrespect for the great (?) man. He could not stand ridicule, so he tried to get square with me.

I did not return to Fitchburg the next day, but remained in Boston and visited the large machine shop in East Boston, where they were making marine engines, and also two other places where they had gas machines for sale. I simply looked at the gas machines without saying a word, and then returned to Fitchburg.

Shortly after this the medium told my uncle that I was conspiring against him; that I had written to the New York merchants and given him away to the Boston companies. A few days later I was taken with the mumps, and my uncle did not come to see me. I knew something was up, and when I recovered I had barely money enough to pay for my board and buy a ticket to Boston. I do not think I ever felt so poor and mean in my life as I did when I was walking up Sudbury Street on a cold damp day. I thought of the size of the city and the great activity on the streets; not one in that vast city knew me except the old medium. When I arrived at Washington Street as far up as the automatic gas machine company's show-room, I

looked in and saw their beautiful work. A tall dignified gentleman was explaining the machines. I walked in and said to him, "I am a brass-finisher looking for a job." In the kindest voice he replied, "I am very sorry indeed, but we have all the brass-finishers that we can employ. I would like very much, however, to get a good mechanical draughtsman: do you happen to know one?"

"Yes, I am a mechanical draughtsman myself," I said.

He was rather astonished, and asked me what experience I had had. I told him that I had always been a kind of an artist, and that I had made all the working drawings for Levi Stevens.

"Very well, that is quite sufficient; you may go to work to-morrow morning."

I asked him what the pay would be, and he replied two and a half dollars a day, which was just double what my Uncle Stevens had been paying me. I told him that Stevens was my uncle, and how I had lost my situation. He was much amused at the part played by the spiritualist. I then informed him that I didn't have any drawing instruments of my own, which was the reason I had applied for a position as brass-finisher.

He said, "Very well, that is easily remedied," and took me at once to an instrument shop where they had some beautiful drawing instruments; I selected the best set they had, price one hundred dollars, and paid for it out of my wages.

This was my first meeting with Oliver P. Drake, and to this gentleman—and he was a gentleman of the first water—I am indebted for a good deal of my success in life. He was by trade a philosophical instrument-maker and understood his business thoroughly.

It was while I was working for this good man that the Civil War came to an end.

The gas machines of those days consisted of a wet meter wheel used as a pump and driven by a falling weight after the manner of a clock. The air forced into the carburettor came in contact with gasoline, which is a very light product of petroleum. When the machine was at the temperature of the surrounding air, and freshly charged, the gas was very rich indeed, and would smoke if used in a common bat's-wing burner, but it was all right in an argand burner. After the machine had been running about an hour, the refrigeration due to evaporation reduced the density of the gas so that it was just right for a bat's-wing burner, but unfortunately it did not stop at this density. If many burners were used at the same time, the evaporator would become very cold indeed, and as the gas diminished in density about as the square of the temperature—reckoning from absolute zero—it soon became very weak and blue. I suggested to Drake that it would be an exceedingly good thing if we could have a density regulator that would diminish the richness of the first gas made and add it to that last made at the end of the evening. He said, "Yes, that would be splendid if it could be done, but it is impossible."

Later on, I made experiments and found that the air expanded just in proportion to the degree that it was carburetted, so that by putting two meter wheels on the same shaft, one slightly larger than the other, the smaller one pumping the air into the carburettor and the larger pumping the gas out, a pressure would be formed in the carburettor if the gas was too rich; and this working on a diaphragm would open a valve and allow the air from the pump to pass directly into the gas pipe, where it would mix with the gas that was too rich, thus reducing the density.

I think this system has gone into general use in the States. I did not get it patented.

After leaving Drake's employ I made another density regulator that regulated the density of the gas by its weight in a large cylinder through which it passed. I made a very large machine of this kind for the Americus Club in Connecticut, in which Bill Tweed was interested. It worked splendidly, and many other similar machines have been made, which I think have since been patented by others.

Messrs. Gilbert and Barker, of Springfield, started to make a gas machine worked altogether by gravity. The machine was placed in the top of the house, and, as the so-called gas was heavier than air, it produced a slight pressure in the lower rooms and gave a good light, but a light wind or the slamming of a door would put it out; the only advantage of this gas machine was its extreme simplicity and cheapness. The insurance companies objected to it, and the makers saw they must make a change. They consulted me, and as I wished to prove that my Uncle Stevens was wrong regarding the retaining power of a spring that I had invented and submitted to him,[1] I readily agreed to make the drawings of a gas machine driven by a falling weight. My clients were delighted, and this new type of machine drove out of the market nearly all the other weight-driven machines, the owners doing a large and prosperous business for many years.

When I had finished this work I got a situation as a foreman in another place. After some months I called on Drake, and he told me that he had made the very large machine of the peculiar type that I had designed, and that it had been put up to light a large mill in the State of New York. The

[1] The retaining power spring was for the purpose of keeping the machine running while it was being wound up.

machine was in a vault underground, just big enough to hold it, where there was neither the room nor the light to photograph it. Could I, from the working drawings, make an india ink drawing to be photographed which would have the appearance of being a photograph of the machine itself? I said I could, and he gave me the order. Twenty minutes later I had a book on perspective which I took home and studied until two o'clock in the morning. I was busily engaged in the day as a foreman, but I worked on the drawing at night, and it was a big job. There were the heads of hundreds of bolts and nuts to be drawn in perspective, but I kept at the job, working every Sunday until it was finished. When it was photographed no one discovered that the photographs had not been taken from the machine itself.

While I was in Boston a large furniture factory was burnt down. As this was the third time this had happened, it was said that no means could be found to prevent it. I invented an automatic sprinkler that would be started by the fire itself and would sprinkle the place where the fire was and nowhere else. It would, at the same time, telegraph to police head-quarters and to the fire station, giving the exact locality of the outbreak. I did all I could to introduce it, but met with no success; no one would believe it possible —"too good to be true," etc. Just seventeen years from the date of my patent the first one was installed in a cotton factory in Massachusetts, but, of course, my patent had expired. These fire extinguishers are now in common use in many places, but not with the telegraphing attachment.

CHAPTER VIII

THE concern that I was working for in Boston wished me to go to New York. It had been paying me five dollars a day in Boston, and offered me seven and a half dollars—about thirty-one shillings—a day for the New York job. The work was being done at the Novelty Iron Works on the East River.

At that time the iron works were making very large marine engines for the Pacific Mail Steamships. Some of the cylinders were 105 inches in diameter, with a piston-stroke of 12 feet, while the paddle-wheels were 42 feet in diameter. On one occasion Leonard Jerome, the grandfather of Mr. Winston Churchill, and Chairman of the Pacific Mail Steamship Company, visited the works, and some of the head officials asked him to take lunch with them. They had boxed in one of the big cylinders which was in the yard, provided it with a door, and set a small table in the middle ; and while Mr. Jerome was having his lunch they told him that they were inside one of the cylinders of his steamships.

At the Novelty Iron Works I acted in the capacity of foreman and draughtsman ; there were many other draughtsmen employed, and I was known by the nickname of " Boston."

We had at that time among the draughtsmen an all-knowing German by the name of Albert Lucius. What this gentleman did not know was not worth knowing. He was

a veritable encyclopædia *vivant*. Not only that, but he called himself the strongest man in the works, and used to go about astonishing the workmen by a display of his great physical strength. He was not, however, a very large man, being perhaps slightly above medium height and weight. We only had one little place in which to wash, and if a draughtsman happened to be occupying the place when it suited Mr. Lucius to wash, Lucius would take him by the surplus of his trousers and pull him out. One day I was washing up, when I suddenly found myself sliding out of the room very rapidly. My hands were wet and soapy ; the men laughed and asked me why I had come out so quickly—why did I not stop and finish the job ? However, when Mr. Lucius had got through I went in and finished washing. The next day every draughtsman was chaffing me.

A few days later, seeing Mr. Lucius out in the yard and knowing he would come in the instant the whistle blew to wash his hands, I went into the little room, but only pretended to be washing. He came up the stairs three steps at a time, seized me by the trousers and pulled me out, but instantly he found himself on his back on the floor. The men were astonished, and Mr. Lucius' face was as red as a beet. He was quickly up and went for me " catch as catch can." Very much to his surprise he was landed on his back again in less than a second of time. He tried it again and down he went ; then he gave it up, and everybody laughed. It was the talk of the place, and the next day when he went into the pattern shop, the foreman pattern-maker said to him, " Never attempt to wrestle with a State of Maine Yankee ; they are very strong and practise wrestling from their childhood up ; it is the principal amusement at their schools."

But I was not the only State of Maine Yankee in the

works. Professor Grant was a well-known figure, but I had never noticed anything peculiar about him. Some of the draughtsmen asked me to guess his age, and I put it down at forty-five or fifty. The next time the Professor came into the draughtsman's room they asked me to examine him. I found he was quite used to being examined and readily submitted. He had not lost any teeth ; they all appeared sound although rather short. He had plenty of black hair only tinged slightly with grey ; his eyebrows and moustache were dark brown. I asked him how old he was, and he said eighty-four. He was six feet two in height and weighed about two hundred and fifty pounds. He told me that he had never drunk a cup of tea or coffee in his life, had never tasted alcoholic drinks of any kind, never had had anything to do with tobacco, and had never had a day's illness, not even a headache. I told the Professor he was very lucky. About a fortnight later his son came in and said that his father had had his first illness, some heart trouble. A day or two after that the Professor came in. He looked his age, and said to me, " Maxim, I am coming to the end of my tether."

" Yes," I said ; " and that is the way a strong man should die. You will probably be in your grave inside of a week." And he was, for he died suddenly a few days later.

While at the Novelty Iron Works I thought much on the subject of automatic gas machines. Up to that time it had taken a very large machine indeed to supply a hundred burners, and there were only a few machines in the States that would supply as many as three hundred. At length I thought out a totally new system. I saw that I could make a machine that would run any number of burners without deteriorating the liquid used, and that the gas throughout, would be of absolutely uniform density, the last

being as good as the first. This system consisted in converting the gasoline into a vapour by heat up to a pressure of about twenty-five pounds to the square inch, and then allowing the vapours to blow through an injector and suck in air, the mixed air and vapour being stored in a small gasometer. I took out several patents on this machine, and made some that would run about one hundred burners each. A little company was formed called the Maxim Gas Machine Company, which had fine offices at 264 Broadway, New York City. We put up several small machines and ultimately got some orders for large ones. A. T. Stewart, who was the wealthiest man in America at the time, owned many mills and some hotels. I lighted all his mills as well as a large hotel that he owned in New York with big machines. Coal gas at that time in New York was very dear indeed, and the cost of lighting the New York Post Office was more than the Government could stand, so one of my big machines was ordered and the nuisance of a gas meter abolished.

Many of my large machines in mills and factories were heated by steam, and I wanted a cheap and effective steam trap—something that would let out the condensed water but not the steam. I invented and made a very simple one, small and exceedingly cheap. It worked by the expansion of alcohol in a closed metallic receptacle with elastic sides; the heat of the steam boiled the alcohol, producing a pressure that expanded the sides and closed a valve, which would open automatically when cooled down a few degrees. It was patented in the States, and many of these were also sold for general purposes.

One day a rich old gentleman by the name of Hawes came to me and asked if I had patented it in England, and when I said I had not, he purchased the right to do so for one hundred dollars. He then patented it in his own name

in England. Later on, when I wanted steam traps in England I was told that Hawes' traps were the best, and on one occasion when I went into a large works in London I saw a mountain of brass castings. On asking what they were, I was told they were Hawes' steam traps ; that they made many for railway carriages and had already sold over 80,000 of them. At first they would not believe me when I told them I was the original inventor, but they had to admit it when a few days later I showed them my American patent. The same principle is now used in incubators.

I found that my system was not only good for large gas machines, but also for very small ones, so I got up a locomotive head-light, having a gas burner instead of an oil burner with its troublesome wick. As the flame was more in the focus it gave a much better light and projected it much further than the oil lamp which had a flame about the shape of a chrysanthemum. These head-lights did very well for a time, but soon all sorts of trouble began to crop up everywhere. Instead of filling the gasoline tank with a clean vessel, vessels that had been used for oiling were often used, and it was not an uncommon thing to find the apparatus clogged up with linseed oil. When, however, I got an order to place them on the New York and Boston line, I took the first trial lamp to Springfield, Massachusetts. Before putting the lamp on a locomotive, I had made a very large and strong galvanized iron reservoir provided with a cock especially prepared for gasoline. I also had some cans made with the proper sort of a spout to fill the tank without the use of a funnel, and on these cans I had painted, "THIS CAN IS TO BE USED EXCLUSIVELY FOR FILLING THE LOCOMOTIVE HEAD-LIGHT TANKS WITH GASOLINE, AND IS NOT TO BE USED FOR ANY OTHER PURPOSE WHATSOEVER." On the tank I had painted, "GASOLINE FOR LOCOMOTIVE

HEAD-LIGHTS." I then put a lamp on a locomotive and a trial run was made; it worked very well, was approved of and a considerable order given, and for a time everything went on very well.

One day there was a convention of leading railway men at Springfield, and while they were banqueting in the evening they saw a tremendous flare of light and flame in the round house where the locomotives were kept. On inquiry they found it was due to one of Maxim's head-lights, and every one of them was ordered off that road, and no more ordered. I found that the cans which I had provided had been taken away and used for other purposes. The engineer had drawn the gasoline into a big wooden pail, set it down near the locomotive with his lantern alongside of it, and of course, it took fire. Being a very wise man, he thought the best thing he could do would be to kick the pail, which he did. This produced a flame about as big as St. Paul's Cathedral, but it only lasted about one minute and no damage was done.

CHAPTER IX

TWO of my large gas-machines were sold to light hotels in Georgia, and I went down to Atlanta to see that the machine for the Kimbal House was properly put up. I noticed that every locomotive from New York to Atlanta had one of my head-lights.

This was not so very long after the war, and there was still a good deal of bitterness against the North, but I had not the least trouble with anyone. Before I went down I visited a place where artists were provided with photographs, and found a very good photograph of a New Guiana nigger; it was the niggerest-looking nigger I had ever seen. At that time they had a coloured man as Governor or Lieut.-Governor of Louisiana, and this was a very sore point with the white Southerners. I marked this photograph "Governor Pinchback of Louisiana." As a matter of fact, Pinchback was not a full-blooded nigger, but rather a mulatto, and very clever. However, the natives of Atlanta didn't know this, so whenever they were discussing niggers and politics I used to take out this photograph and hand it to them. They would pass it round with such expressions as "What a disgrace!" "The idea of having a nigger like this as Governor of a State!" "What are we coming to; next we will have a gorilla!" I also amused them very much by drawing comic sketches.

But certain events took place while I was in Atlanta that threw a good deal of light on the condition of things at that

time. So long as there was a large garrison of U.S. troops quartered at Atlanta, the natives were always objecting to their presence, and the local papers were full of abuse; but as soon as the troops were withdrawn they were equally bitter on account of losing the trade. One day a handsome young man, a lieutenant, with a beautiful and faultless uniform, arrived by the train. He went to the Kimbal House, and while registering his name, a young man, who was said to belong to one of the "first families," but was very dissipated, pushed up against him and said: "Who the h—— are you?"

"I am a gentleman and an officer in the United States Army; you are neither," the officer replied.

The young Southerner, whom we will call Higgins, because that was not his name, thereupon drew a big revolver and shot the officer dead where he stood. He was arrested and very soon tried before a judge and jury, all Southerners, and was at once acquitted on the ground that he did it in self-defence. This made me think of the Irishman in New York who shot a wooden Indian in front of a tobacco shop, and was arrested for disorderly conduct. His defence was that the Indian was holding up a tomahawk; he thought his life was in danger, and so he shot him. But self-defence did not work on this occasion, and Patrick had to go to the Island for one month.

Interesting events followed each other in quick succession in Atlanta at that time. The brother of Higgins had a fight in the bar-room under the hotel and killed his man. By some hook or crook he too got off. There was also a duel between two boys, each about fourteen years of age. They fought with shot guns at short range, and the fathers of both were present. The result was that one of them had his left arm nearly shot off.

One Sunday evening a young gentleman, his sister, and his sweetheart went to church together. The young gentleman belonged to one of the "first families"; that is, his father was one of the leading citizens, a man of great wealth and influence. When this young gentleman had seen the two young ladies home he went round to a peculiar establishment, common in the Southern States, and while he was sitting with a young lady on his knee Higgins came in. It was Higgins' favourite girl, and he shot the young man dead as soon as the girl was out of his lap. Everyone said then that Higgins would be punished. He had killed a member of one of the first families in a house of ill-repute. He was arrested, tried, convicted, and sentenced to be hanged. Just before the fatal day his sister obtained leave to visit him in prison. She kissed him passionately, and the next morning it was reported that Higgins had been found dead in his cell. The verdict of the coroner's jury was that he had died from strychnine poison, probably contained in a soluble capsule passed from his sister's mouth into his. There was a funeral and the affair seemed to be finished. Two years later a citizen of Atlanta while travelling in Alabama met Higgins face to face. A corpse had been borrowed for the purpose of conducting the fraud.

While I was at the Kimbal House, which was a very fine hotel, I met a good-looking and intelligent English lady, by the name of Haldane, with her little son. She was about thirty-five or forty years of age, and had travelled a great deal. Her husband was dead, having lost his life while fighting for his country in India. She was very clever and a good talker. One of the young bloods of the town had built for himself a little wooden shanty, not far from the railway station; it was about eight feet wide and ten feet long. One night the place was raided by the police and a

young yellow girl about sixteen years old arrested. She was tried, convicted, and fined five dollars and costs, which her mother, a washerwoman, managed to pay; but not more than ten days had elapsed when the same thing occurred again, and this time the girl was fined ten dollars and costs. This the mother paid by selling her cow. A few days later the same thing occurred again. The girl was arrested and fined twenty dollars and costs; this was too much for her mother. So this young and pretty girl was put to work in what was euphoniously called the chain gang; but the only chain that kept the prisoners together was a rough-looking individual, known locally as a "Georgia Cracker," armed with a double-barrelled shot gun. It was his business to shoot everyone that attempted to run away. I often stopped to look at this motley crowd in the chain gang. The most conspicuous prisoner in the gang was an extremely large United States soldier, dressed in the uniform of his country. There were all sorts and sizes of miserable-looking individuals armed with shovels, picks, or hammers, and among the lot the pretty little yellow girl, looking very demure.

The sight of this poor girl working with these scoundrels, with a loaded shot gun to keep her from running away, made the elegant Mrs. Haldane's blood fairly boil. I being a Northerner made no remarks on the subject, but a handsome English woman was in a different position. The leading minister of the place was the Rev. Dr. Westmorland; he sat at the same table with Mrs. Haldane and myself, and it was amusing to hear this English lady talk to the parson regarding the poor coloured girl. She asked him what had happened to the young man—had he been arrested? Why was it that he was not in the chain gang also? She asked him if one could consider a people civilized that worked

young women on the street breaking stones under the muzzle of a shot gun? Then again, it was not more than two hundred yards from the young man's little shanty to the place where the same thing was carried on openly by white women—why were they not arrested?—why were they not in the chain gang?

If a Northern man had talked in the same manner he would have been shot on the spot.

Some two or three years later I was walking up the Bowery, New York, when I met Higgins No. 2, who killed the man in the bar-room. He appeared glad to see me, pulled a big revolver out of his pocket, and said: "This is the revolver with which my brother shot the lieutenant." He next produced one of a different pattern and slightly smaller, and told me it was the one used by his brother to shoot the young gentleman. Then diving into another pocket on the other side he said: "This is the pistol that I killed that fellow with in the bar-room; I believe you were there at the time." I admitted that I was in the hotel, but I had never been in the bar-room.

While I was in Georgia I learned that a black man has no rights which a white man is bound to respect. The engineer of the hotel was a Virginian, and a rather clever fellow, and one night when there was a grand ball the engineer struck and took his fireman away with him. The hotel could not be run without water, and all this had to be pumped; there was nothing to make the elevators go, and as the gas-machine was heated by steam there would be no gas unless there was steam. The hotel keeper was in such a dreadful fix without an engineer that he did not know what to do. Seeing his great distress, I told him that I was an engineer myself. I collared a nigger, went down into the boiler room, fired up, soon had a head of steam, and started

the elevators, or lifts. Having filled all the water tanks and instructed the nigger to keep up the fire I went up to my room, changed my clothes, entered the ballroom, and danced several times with the elegant Mrs. Haldane. A beautiful young widow from New Jersey was present. She had a splendid figure, and was one of the handsomest women I have ever seen. The contrast between this beautiful Northern lady and the rather thin and sallow Southern women was very marked, and all the men were buzzing round her like flies around a honey pot. No doubt I should have joined the procession had it not been for the lovely Englishwoman.

After about an hour I went to my room, changed my clothes again, and spent the night in the engine- and boiler-room. I was quite unable to keep the nigger awake.

The next morning I told the landlord that it was rather a tough job. He asked me to get him an engineer from New York. I telegraphed for one, and three days later my Scotch engineer, Alexander Macgregor, arrived, but the first night that he trusted to a nigger the lights went out through lack of steam. It was not until he obtained a white assistant that he succeeded in keeping up steam all night. He told me that no amount of beating would keep a nigger awake at night.

CHAPTER X

MESSRS. A. T. STEWART and Company finally ordered from us an extremely large gas-machine, much larger than any that ever had been made before. It was to light the Grand Union Hotel, Saratoga, which was very large, having fifteen hundred bedrooms, the Windsor Hotel, a fairly large one, and the St. James', a small hotel. I made this big machine and put it up in record time. After it had been running successfully for some time Judge Hilton, who at that time was A. T. Stewart's head man and adviser, introduced me to Judge Brady, of New York City, as "the man who abolished the nuisance of a gas-meter."

I made this big machine in a great hurry. It had one gasometer and two evaporators heated by steam from the main boiler of the hotel. Either one could be used, each being large enough to furnish all the gas by itself. As everything was absolutely ready two days before the hotel was to open for the season, I started up the machine, when—horror of horrors!—the gasoline ran in a stream from the cast gunmetal base of the evaporators. I had tested these with high-pressure water and also with air; if the air had passed through under high pressure it would have made bubbles, so I thought I was safe. But the gasoline under much less pressure ran through the metal, so that there was a small stream running out between the cast-iron bedplate and the casting in question.

I went to bed that night feeling very blue ; I thought the matter over. I could not possibly take the machines back to New York City, take them apart and coat the inside of the big bronze casting with solder. About midnight a very brilliant idea struck me, and the next morning I purchased a gallon of common molasses (treacle). I mixed with this a small quantity of flour and some lamp-black, and put about two quarts of the mixture into each evaporator. Of course the molasses could not possibly leak through the bronze and the gasoline could not leak through the molasses. It was a perfect success ; the night of the opening the hotel was illuminated from top to bottom, and everything went off without a hitch during the whole season.

When there was a lively demand for my gas-machines, I had a considerable number of the larger sizes made by Harold and Hayes, of Paterson, New Jersey. This firm manufactured the sheet brass work for locomotives and supplied the three firms of locomotive builders in that city ; they also built steam fire-engines.

This was in 1873 or '74, and as the firm was anxiously seeking for orders they wished to enter a competition in Williamsburg, which is a part of Brooklyn. The drawings of their fire-engine had been made by one of the best draughtsmen from one of the locomotive shops. As far as the boiler, the engine, and the pumps were concerned, the design was all right, providing the engine was to be run at a moderate speed, but a steam fire-engine has to run at a very rapid pace, and this was where it fell short.

At that time there was a firm of fire-engine builders in Central New York that used a rotary engine and a rotary pump, with a small rotary engine and pump for supplying the boiler with water. This engine was the only one in the States that could be depended upon to suck water more

than eight feet. The manager of this firm, being a very clever fellow, succeeded in having a finger in the pie in drawing up the contract and the rules and regulations for the trial. He saw the city officials, and pointed out to them that many of the fires were on the river front, and it was necessary to have a fire-engine that would take the water directly from the river, the engine standing on the dock over the water. This clever individual managed to have a clause included to the effect that all competing engines should be able to prime themselves and draw water from the river when the pump was eighteen feet above the water, that no water was to be put into the pump or the suction pipe, and that the suction pipe should not be provided with a foot valve.

It may be readily seen that the builders of steam fire-engines having reciprocating engines and pumps could not very well accept these terms. The pumps of a steam fire-engine have to work with very great rapidity and pass a vast quantity of water in a minute of time. They therefore have to be provided with very large valves and a lot of space ; and when this space is very large the air is simply rarefied and condensed by the action of the pump, without sucking any water.

Messrs. Harold and Hayes consulted me on the subject, and after I had examined their pumps and seen how small the pistons were compared with the air space, I told them that I did not believe it would prime when the water was more than five feet below the pump. But they did not agree with me ; they said they would run the engine so fast that it would prime anyway. I told them that speed was not a factor in the equation. However, they took the engine out and tried it, but it failed to prime at five feet. They then connected it with the street main, and ran it for the purpose

of showing me what it would do. I found that they could not keep up steam. I climbed up on one of the wheels, and with a long carpenter's shaving in my hand discovered that at one side of the big smoke-stack the air was drawing down ; this showed that the jet was not in the centre. I then found that the valves hammered very badly, and that the grate got very hot indeed. On taking the engine into the factory we found that the grate had been practically melted and was much deformed ; on examining the pumps we found that the valves were injured badly by the pounding, and, as I expected, the jet discharging the exhaust steam up the chimney was not in the right place ; it was too large, and not co-axial with the chimney or smoke-stack. This accounted for the draught being bad. They also said that although they had employed or consulted all the best painters in town, none of them were able to paint the engine the right kind of red. They wanted the exact colour employed by the Amoskeg Company.

I undertook to put everything right in a few days. I made a little ejector and connected it with the four discharge valve chambers of the pump by four small brass tubes, each provided with a ball valve, and so placed the ejector that the discharge was directly into the hose-pipe connection. This ejector was connected by a small tube to the boiler, and I found that the maximum effect was produced with a pressure of twenty-five pounds to the square inch. I provided eight new valves to the pump, and these were made on a totally new plan, as far as I know. In falling to their seat they first imprisoned a little water in the seat of the valve itself, which could only escape slowly, so that it was impossible for the valves to strike the seat with any degree of force. I made a new pattern of a grate which, instead of having a flat top like the old one, had a

very deep groove cut in the top of the bars, and this was filled with ashes before the engine started. I put a bushing of the proper shape and size in the smoke-stack, made a new and smaller jet for the exhaust steam, and placed it at a greater distance from the uptake. I observed the same rules that obtain in locomotive practice in this respect.

I first painted all the parts with the very best English vermilion, the same as before: I then glazed them with three thin coats of carmine containing varnish; and when all was dry the whole was varnished with coach varnish. This gave the exact colour required.

Upon trying the engine again it did everything that was required of it. The boiler made more steam than could be used, the grate did not get out of shape, the valves did not pound, and the pumps primed at a distance of five feet. I was sure that it could do much more.

When the day for the competition came the Silsby rotary was the only other engine in competition. The Silsby engine was the first tried. As it was very wasteful of steam it had to have an extremely large boiler, and the exhaust could be heard for a distance of five miles, while the exhaust from the feed-pump engine simply screamed. There was no trouble in sucking the water from the river at a distance of eighteen feet, and they were cocksure that the other engine would not do it. However, the smaller engine was fired up, and when it had twenty-five pounds' pressure to the square inch a little valve was opened which attracted no attention, and very soon the water was sucked up from the river, filling both ends of the two cylinders and the valve chambers, so that when there was one hundred and fifty pounds' pressure to the square inch and the engine was started, water was discharged at once, very much to the astonishment of the Silsby people. The engine ran very smoothly,

there was plenty of steam, and whenever a piece of coal became reduced to the size of a filbert it left the grate and went through the smoke-stack. Everything went all right, the engine was well balanced and the pumps quite noiseless without any beating or pounding. The reciprocating engine threw water quite as far as the big rotary, and as the boiler was much smaller and the whole thing much lighter, Harold and Hayes got the order. It was, indeed, a very beautiful and very effective engine, and I believe a good many were afterwards sold.

In my long experience I have never known a case in which a little knowledge of engines, boilers, and hydraulics was so useful.

CHAPTER XI

IN one of the factories in New York, where some of my work was being done, there was a big, good-natured Irishman, whom we will call Patrick O'Connor. One day at the noon hour, while the men were loafing before resuming work, this big Irishman approached me and said, "Mr. Maxim, whoy is it that the Oirish are so much sthronger than the Americans?"

I replied that I didn't know that they were; it was certainly news to me. I asked him who told him so.

"Everybody says so," was his reply.

"Then I suppose you. an Irishman, are very much stronger than I am?"

"Certainly."

I asked him to step on to the scales with me. Quite true, he was a heavy man, and I only weighed a pound more than he did. He said that was all right, that it was not enough to count. So I rigged up an arrangement by which we could test our strength in lifting. When he attempted to lift the load that I had already lifted, he said: "There is some trick about it—it is fastened down"; but when one of the other men suggested that he should take off half of it he found that he could lift it. The result was that I lifted all the Irishman could lift, with the Irishman on top of it and two hundred pounds besides. A large American, of Dutch descent, came within fifty pounds of lifting as much as I did. Then there was a big drop to a rather small

Scotchman, but this little fellow was able to lift more than any Irishman on the premises.

O'Connor was, I think, about twenty-four years of age. One day he came to me and said : " You are the best master I ever worked for ; no one could be better, but I am sorry, I must leave you." I asked him what had happened. He told me he had joined an Irish army under General O'Neal, and that they were going to march to Canada, conquer the country, build ships, destroy the English Navy, and liberate Ireland. This appeared to me to be a very tall order. I tried to impress upon the poor ignorant fellow that the British nation was very powerful, that he had no knowledge of the science of quantity, that he was not a mathematician. I told him that they couldn't conquer England even if they robbed every hen's roost in Canada. I reminded him that New York State had sent four hundred thousand men to the front, that probably Canada had at least half as much fight in her as the State of New York, and that it would take rather a large army to invade Canada in the face of two hundred thousand men. All this was Greek to him. He said he didn't know himself, but General O'Neal did.

O'Connor left. He joined the General's army, and they assembled in the State of Vermont, near the Canadian frontier. There were about two hundred of the rag-tag and bobtail in the army of invasion, with a few thousand Canadians on the other side waiting for them, their object being to allow the Irish to enter and then capture them. General O'Neal visited the field of battle on foot. He had a gorgeous uniform, and his sword was so long that it dragged on the ground. He was a small man, but so was Napoleon ; and, of course, before commencing operations it was necessary that he should make a speech. He said :

" Soulgers, we are about to inter the inimy's counthry with sabre and bayonet, and niver to return till we are victorious or dead."

About this time, when all eyes were fixed on the brave General, a four-wheeler with two horses was driven rapidly on to the field of battle. A strong man jumped out, grabbed little O'Neal and his sword, chucked him into the cab, and drove rapidly away. The " Soulgers " were flabbergasted, and being deprived of their leader, disbanded. The strong man referred to was an American marshal; he took the General to St. Albans, Vermont, put him in the cooler, and gave him twelve months to cool off. A year later I happened to be travelling in the same railway carriage that took the General back to New York; he was in a very seedy condition.

When the *army* disbanded O'Connor had to look out for himself. Having no money, he had to walk home. When he arrived, he was dirty, hungry, and completely used up. All the boys contributed money to enable him to get something to eat and a pair of boots, and he was soon at his old job again, grinding and polishing the inside of locomotive reflectors.

But O'Connor was not content, so he decided to go to California. He saved up a little money and paid his fare, third-class, by way of Panama. However, he was soon back again; he had worked his return passage in the stokehole of the ship, and he looked it. I asked him why he didn't stay in California. He said he landed all right, but as he was walking up the dock everything seemed to tremble under his feet; he looked up and saw the buildings, church steeples, and tall chimneys reeling and toppling over, and finally falling to the ground. Although he was used to the motion of a ship this made him sick. He went back on

board the ship and said "the divil himself couldn't induce me to go on shore again."[1]

Once more O'Connor was rubbing and grinding away on the inside of reflectors, and again he gave up his job, received his money, and left. He was usually very poorly dressed; his clothes were always out of order; the job that he had was a very dirty one; and as he had a broken nose, had lost several of his fingers and not a few of his teeth, he did not present a very fine appearance. However, when he had been gone about six weeks, a large, tall, and elegantly attired gentleman called. He was rigged out in the height of fashion, including diamonds in his shirt and a heavy gold watch and chain. At first he was not recognized, but soon someone said, "Why, it is Patrick!" and sure enough it was. He came in to see if he could sell some gold watches; he had them in every pocket. They were of various kinds and sizes, with and without chains, and all second-hand. As nobody had the money to purchase such expensive watches he departed. One of the men approached me and said: "I'll bet you Pat's drawing the badger." A few weeks later we saw an account in the newspapers that this man and a beautiful English blonde, who at one time was a member of Lydia Thompson's troupe, had been arrested for robbery by a game known as "drawing the badger." O'Connor got five years at Sing Sing, and the girl was sent to the Island for a shorter term. This was the last I ever heard of this interesting gentleman of varied experience.

When walking through Courtland Street, New York, I had often noticed and was much puzzled over a peculiar individual whom I was constantly meeting. He was about twenty-seven years of age, with long light brown hair,

[1] It was the day of the great earthquake.

rough and matted, and yellowish whiskers a quarter of an inch long. He was dressed in a shabby butternut suit, an old and battered silk hat, and the roughest kind of thick cowhide boots well daubed with red Jersey mud with his trousers pushed inside of the legs. He carried a little bundle done up in a red handkerchief, and always appeared to be walking up with someone from the Courtland Street ferry. On one occasion I saw him with a tall and athletic man who appeared to be about sixty years of age.

When coming from the ferry I had noticed a half basement on the right-hand side of the street, where a large number of buff envelopes were exposed in a long box with a couple of flashy individuals in charge. This was what was known at the time as " The Envelope Game." A large number of envelopes were supposed to contain five- and ten-dollar bills, and no matter where these men picked out an envelope it was sure to contain a ten-dollar bill. They replaced the bill in the envelope, which was put back in the box ; then they allowed anyone to try their luck for one dollar.

On this occasion the dilapidated Jerseyman with the red mud on his boots stopped and anxiously looked at the box ; he was immensely interested. The man of the envelopes took out one, showed the ten-dollar bill, and put the envelope carefully back into the box, leaving it projecting about an eighth of an inch above the others. The dilapidated individual whipped out a dollar bill, gave it to the attendant and took out the envelope ; sure enough, it contained a ten-dollar bill. They told him he was very lucky and congratulated him. Again he tried, put down a dollar and got another ten-dollar bill. He changed the last ten-dollar bill into dollar bills, and went on with the game, each time succeeding in getting ten dollars for one. They then

refused to play with him any longer. He whispered to the man who was with him and advised him to try his luck; but curiously enough, no matter how many times the old fellow tried, he always drew a blank. When they had got his last dollar he "smelt a rat," saw that he had been taken in, and having been taken in, he sailed in—he was a fighting man. He first knocked down the gentleman with the red mud, and then went for the two dandies. He floored both of them and commenced to smash things, scattering the envelopes all over the place and using many swear words, and then looked round for something else to destroy.

All the time the big policeman was standing by my side with a broad grin. He said, "Oh, my! isn't the old fellow a fighter; why, he's a regular bruiser." It seems that it was the habit of this dilapidated Jerseyman with the red mud to cross the ferry whenever the train arrived, attempt to get into conversation with a greenhorn on the ferry-boat, and if the attempt succeeded to fleece him.

While I was actively engaged in New York I was constantly meeting a man from New Jersey by the name of Waterman. He was a nice, mild-mannered man, but was always importuning me to have my life insured, and he had a great deal of literature on the subject to trot out and show me. Often when I had got into a snug corner in a tramcar and had commenced to read about the latest prize fight, someone would give me a nudge, and on looking round I would find it was my friend Waterman, who would generally say: "Allow me to call your attention to the advantages of the endowment plan."

He annoyed me so much that I made various plans to get rid of him, and finally decided that the best way was to kill him. He was positively worrying the life out of me; I was losing flesh and could not sleep at night; if I had the

nightmare it was always the same thing—Waterman and the endowment plan. Finally, I ceased to meet him; I hoped that something had happened to the fellow. I was greatly relieved.

Two years passed, and one day, while crossing the Brooklyn ferry, I saw my old tormentor walk in. He came and sat beside me, greeted me warmly, and made a nice little speech, which was about as follows:

"I didn't do very well in the insurance business, so I gave it up, and went about the world looking for something to do to keep the pot boiling, and at last found what I think is all right. Have you noticed that workmen in the shops use sand with the soap to scour the dirt off their hands? Now that is all right, but if you will examine the sand under a microscope you will find that the grains are not sharp at all; the corners are rounded. Suppose, now, you take quartz, which is very plentiful, and crush and sift it, you will find that it is sharp and angular. When this is mixed with soap it is infinitely more effective than the Coney Island sand which is now in use. I have been taking orders for this quartz sand and have met with a great degree of success; Babitts, the great soap-makers, are taking two thousand tons, and my commission on that order alone amounts to twenty thousand dollars."

I looked at his seedy clothes, and particularly noted his hat, which was of the kind known as "steeple crown"; that is, it was like the frustum of a cone with a very small top, the discarded fashion of several years before, and it looked very odd indeed.

About this time the ferry-boat bumped up against the bridge and we went ashore. As I shook hands with him, congratulating him on his success, he touched my sleeve and said gently, in a low, calm voice:

" I say, Maxim, would you mind lending me fifty cents to get my dinner ? "

He told me that he had not received his commission because he had been unable to make any deliveries, as the machine was not able to turn out the material fast enough, but that a new and improved plant would be in operation in a few days when everything would be all right.

While in Rochester I came very near tumbling into a big fortune. I had formed the acquaintance of a retired locomotive engineer, called in England an engine-driver. He claimed to have been on the road a very long time and was looking for something better.

Some months later while I was working on my locomotive head-lights and was on deck before seven o'clock in the morning, who should walk in but this locomotive engineer. He greeted me very warmly, in fact enthusiastically ; he turned his head over sideways, looked at me admiringly, and said : " It's true, you're the best-looking man I ever saw, and I've always told everybody that you were. Well, I am glad to tell you that I have tumbled into luck. I've always had great expectations, although sometimes I have been so poor that I did not know where the next barrel of flour was coming from ; but I have always looked forward to something better, and now it has come. I assure you that after all these years of toil and trouble, disappointment, and vexation, it is very comfortable to feel that hereafter I can sit under my own vine and fig-tree, have everything that I wish, and live in luxury with no thoughts for to-morrow. To tell you the truth, Maxim, I have come into a very large fortune. You have been very good to me in the past, you have often lent or given me money, and now I have made up my mind to do the square thing by you. I haven't any children, I am an old man now, and

when I have finished I propose to leave the fortune, which I have lately come into, to you, whom I regard as my sincerest friend. The papers are all made out, and all I have to do is to go to a magistrate at ten o'clock this morning, sign the papers, and I shall receive a large instalment of the money. But I was so very poor that I had to cheek it on a freight train to Albany, and I came down the river last night as a deck passenger. I haven't got a cent left and I haven't had any breakfast; can you let me have a dollar?"

I opened my wallet, and as I turned over the notes he saw a three-dollar bill; he took it and said: "That will do. I will call for you here at noon and will take you out to the biggest and best lunch you have ever had in all the days of your life. I shall go first and get shaved, buy a new suit of clothes, a pair of boots, and a silk hat."

I have been waiting for him to return for many years, and as he was a very old man at that time, I begin to lose hope; I shouldn't wonder if I have lost that three-dollar bill.

CHAPTER XII

PEOPLE were now beginning to talk about electric light. We read that something was being done in that line in Paris. A gentleman by the name of S. D. Schuyler, who had a large, fine office in the Coal and Iron Exchange and a very powerful backing of wealthy men, formed the first Electric Lighting Company ever formed in the United States. As someone had recommended me as an engineer who was able to attack any possible problem and make a good job of it, Mr. Schuyler sent for me, and I became chief engineer to the Company. This was two years before Edison took up the subject.

I found a very curious state of affairs in Mr. Schuyler's office. He had in his employ a large, clumsy, and brutal-looking fellow, clean-shaven, whom we will call Mr. D.; he was said to be an expert electrician and telegraph operator, but he was a great drunkard, being comfortably "corned" all the time, and he had a brother younger than himself who delighted in quarrelling with the nigger on the elevator. There was also a Mr. Smith, who was a good telegraph and battery man—indeed, he was said to be the best in New York. I found that they had made a little boat equipped with a motor, invented by Mr. D. We got into this boat and the man in charge took us for a sail on the North River. The boat was loaded down nearly to the water's edge by the heavy battery, and we were only able to attain a speed of about half a mile an hour. Finding that we were at the mercy of the current, we signalled for a row-boat and were safely towed into our dock. The

next day I asked Mr. Schuyler to go with me to the foot of Court Street, Brooklyn, to see a little steam launch that I had made for my own use, and which I called *The Flirt*. It was one of the most beautiful boats that had ever been made at that time with a very active boiler and a neat little engine, everything being nickel-plated. There was a wide gold stripe completely around the hull, with scroll-work on the bow ; it was really a very elegant affair. I had it fired up and ready when Mr. Schuyler and his friend took their seats in the boat. I ran the engine myself and had a boy to fire. We were quickly out into the water, and when I opened the throttle valve with one hundred and eighty pounds' pressure in the boiler, everything fairly hummed. Although the engine was running at a terrific speed it made little or no noise. The hull had been made by the most skilful boatmaker in New York, and soon we were going through the water at a very rapid rate. I asked Mr. Schuyler to look aft ; on doing so he found that the water was piled up about two feet higher than our deck. This always occurs in small boats that run very fast. He was delighted, and after sailing about for a long time and making various evolutions, I ran rapidly up to the landing-stage, shifted the eccentric, reversed the engine, and brought the boat suddenly to a state of rest.

The next day he told me that he was a great believer in the future of electric lighting ; that he was the first in the field, and that if I would take hold and assist him he would give me a salary of ten dollars a day, as well as a quarter interest in whatever might accrue from the work. This was an exceedingly good offer, especially as I had complete charge of the place. He informed all the men that I had been put in charge, and the first thing I did was to have a talk with Mr. D. I told him that it was

not quite the thing to have brandy brought into the place several times a day and to keep on drinking it while at his desk. I assured him that there was a great deal more nourishment in a pint of milk than in a gallon of brandy, and advised him strongly to try milk. The next day he provided himself with a two-quart tin pail, and his brother was sent out two or three times for milk. Mr. D. said that the change was a good one and he felt much better for it. Shortly after I learned that the so-called milk was just about half brandy, and that the fellow was still in a half-drunken condition all day. As things went on from bad to worse I made up my mind that we had better get rid of him.

In the meantime Schuyler laid a lot of books before me, some of them in French, which at that time I did not understand very well, asking me to make a study of the question of electric lighting, and prepare a report as to how it might best be accomplished. He wanted an incandescent electric light, but did not know whether it should be of platinum or carbon. After making some experiments I found that platinum would melt when it was giving no more light than a red-hot poker, and that its shape changed every time it was heated sufficiently to give light. Carbon was evidently the only thing that could be used.

My report to Mr. Schuyler has unfortunately been lost, but it included the following and much more besides :—

REPORT

" Many experiments have been made in Europe and America with a view to making an incandescent electric lamp, generally by heating the carbons in a so-called vacuum, or in some gas which is free from oxygen, but all have been failures. If the carbons are made hot enough to give a fairly good light they soon burn out, very much

as they would in the atmosphere. Then again none of the lamps of which I can find any record have been made on a plan that would exclude all atmospheric air. Some years ago it was asserted by scientific men that the most favourable condition for electricity was a vacuum. They found that if they melted platinum wires into each end of a glass tube and pumped out the air, electricity would pass through the vacuum thus formed, giving a purple glow; but later on, it was discovered that electricity would not jump for a single millimetre in a real vacuum. An experimenter, by pumping out about ninety-nine hundreths of the air in the tube, filled it with pure carbonic acid gas, and when he had pumped out ninety-nine per cent of this there was only one ten-thousandth part of the original air left in the tube, the rest being carbonic acid gas. By repeating the process he only had one-millionth part of the original air left, and the next repetition left only one ten-millionth part, all the rest being pure carbonic acid gas. He had enclosed in the tube a small quantity of caustic potash: and by sealing the tube and laying it aside for some time all of the carbonic acid gas in the tube was absorbed. It was then found that a real vacuum was the most unfavourable condition for electricity; it would not pass at all, no matter how high the tension.

"It is possible and quite probable that electrically heated carbons would not be wasted away to any great extent by being heated in a real vacuum; and as it has been found that a high vacuum can only be maintained in a vessel that is all of glass, I think the best, in fact the only, way to make an incandescent lamp would be to place the carbons between two platinum wires both melted into the glass; and then pump out all the air that it is possible to pump out, fill the lamp with hydro-carbon vapours, and repeat this

until there is nothing left in the lamp except a minute quantity of the vapours of gasoline. And as it has already been found that carbon is deposited from these vapours by a high temperature it is only reasonable to suppose that some of the carbon of the gasoline will be deposited on the hottest part of the carbon, and in this way the weaker parts of the carbon would be built up and strengthened. I recommend that we commence experiments in order to see if we cannot make a successful lamp on this plan."

Schuyler was very much taken with the plan, thinking it very reasonable. I went at once to a glass-blower and ordered a lot of the glasses to be made. They were practically the same shape as those in use to-day, only considerably larger.

At this time Mr. D. was working on a lamp in which the carbons were heated in an atmosphere of nitrogen, a system which I knew could not possibly succeed. Mr. D. was, however, a very plausible talker. He laughed at my plan, saying that it was the most absurd he had ever heard of, and in my absence he had a very serious talk with Mr. Schuyler. He said: "There is no doubt but that Maxim is a very skilful and rapid draughtsman, but he knows absolutely nothing of electricity or chemistry." He told Schuyler that gasoline vapours were about as explosive as nitro-glycerine, and that to heat a carbon white-hot, in an atmosphere of such vapours, could have but one result—a terrific explosion. He said he would not remain in the building if such experiments were to be made, as it was altogether too dangerous, and he felt sure that the owners of the building would never consent to have such dangerous experiments made on their premises.

Schuyler was somewhat frightened, but I told him that

the quantity of gasoline vapour in a lamp would be infinitesimal, and that gasoline vapours could not possibly explode except in the presence of a large quantity of oxygen gas. However, it was no use : my theory appeared to them to be ridiculous. Nevertheless, Schuyler consented that I should apply for a patent on the principle of preserving and building up carbons in an incandescent lamp by heating them electrically in an attenuated atmosphere of hydro-carbon vapours, and this patent was filed at the Patent Office ahead of all others.

I knew I was right and was determined to convince Schuyler that I was right. Quite true, I was not what could be considered a professional chemist, but I knew all the chemistry connected with hydro-carbon explosions ; and after a good deal of trouble I got Schuyler to consent that some experiments should be made. In the meantime, Schuyler had become disgusted with Mr. D., who was always drunk, and discharged him. I then succeeded in getting the whole question submitted to Professor Van der Weyde, a very clever college professor, and the father of the well-known photographer of London.

The experiments were made in Brooklyn at a shop belonging to James Brady. I had obtained a very large and strong glass globe, and arranged to establish a voltaic arc inside this globe. I put about half a pint of gasoline into the globe and closed it up airtight. Upon turning on the electric current and establishing the arc, a very dense black smoke was produced; and after running for two or three minutes the current was turned off and the receptacle opened, when it was seen that the positive carbon had deposited upon it a lump of carbon as big as a large walnut. On breaking it up, we found that the inside, near the arc, was a bright grey, and semi-crystalline. The Professor took some of

this and found that it would actually scratch glass. He said we had come pretty near making diamonds. He was delighted. I then took some very thin strips of carbon and heated them in a highly attenuated atmosphere of gasoline vapours and discovered that the carbon was deposited on the weakest and hottest parts, and that it was of a steel-grey colour. I took some of these pieces of carbon to Professor John Draper, the historian, who was quite expert in chemistry and electricity, and he also told me that I had come very near making diamonds, and suggested that I should make some experiments under a very high pressure ; which I did, many years later.

Professor Van der Weyde did me a very good turn by convincing Schuyler that I was quite right and that I had made a great discovery ; but he followed it up by unintentionally doing me a very bad turn indeed. He wrote an article for one of the scientific papers, stating that he had seen me deposit carbon that was hard enough to scratch glass, and that this took place in the dense vapours of gasoline without the least sign of an explosion. This was very soon brought to the notice of Mr. D. who, not knowing that I had applied for a patent on the process, applied for a patent on a process of building up carbons by heating them in oil, such as salad oil, or other carbonaceous material. His claim was a very broad one, and, of course, later on, an interference was declared.

By that time I was very busy indeed making dynamo-electrical machines, arc lamps, etc., and putting them up in various parts of the country, as well as in the New York Post Office, the first public building to be lighted by electricity in the United States. Some years previous I had lighted the building with a large gas-machine. I was not sure that much could be done with incandescent lamps ;

so when the interference was declared I simply went in and told my story, leaving the rest to the lawyers. But Mr. D. swore that he had invented the same thing years before, and got his father and his brother to swear to it. He thus beat me in the Patent Office and deprived me of a patent that was worth at least a million dollars a year.

But everything was not smooth sailing by any means for Mr. D. He went to the Patent Office at Washington, abstracted a patent, made an alteration in the drawings, and returned it. This being discovered gave him a very black eye at the Patent Office. Later on, he had a quarrel with a Captain Steel, whom he shot in the face with a revolver, doing him very serious injury. There was, however, a woman in the case. Mr. D. was arrested, and when the case came into court he claimed that he had only acted in self-defence, although he admitted that he had fired the first and only shot. Mr. D. had several witnesses who swore that they had seen the encounter, but it transpired that they all happened to be telegraph operators, and the judge discovered that when these witnesses were on the stand, Mr. D. was communicating with them by a species of telegraphy which he had invented for the purpose. He was convicted and sentenced to a long term of imprisonment, but he had influential friends who had invested money in his alleged invention, and they obtained a stay of execution, so Mr. D. was out of prison for a considerable time.

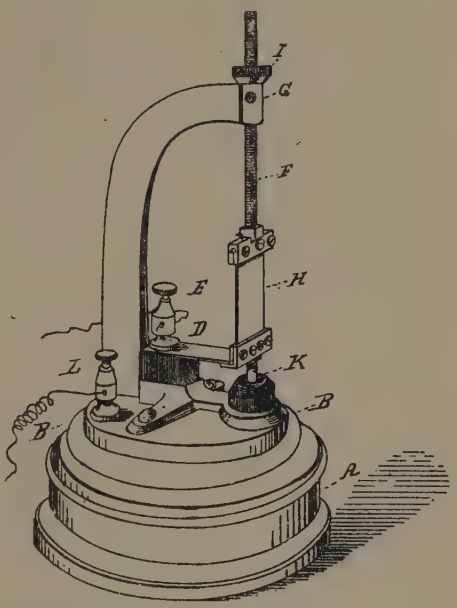
I went to one of the high officials of New York City and told him that Mr. D., although convicted, was still out of prison. He admitted that it was a disgrace, a miscarriage of justice, and promised to see to it that the fellow was put where he belonged. When, however, an attempt was made to send him to prison, he pretended to be very ill and his doctor certified that he could not be moved from

his bed without fatal results. Physicians, representing the law, visited Mr. D. and found that he was really suffering from a severe irritation of the stomach and bowels, but as it was necessary to keep this up he took a little too much acid one day and died of peritonitis.

In the meantime Edison had come to the front. As everyone knows he is one of the cleverest scientific men in existence, as well as a clever business man with a very powerful backing. Edison had not gone very far in his experiments when he found that there was only one way under heaven to make and to standardize the carbon filaments for incandescent electric lamps, which was by heating them electrically in a highly attenuated atmosphere of hydrocarbon vapours. This I had done a year before. He had to use my process or give up the job. He then employed Professor Van der Weyde as an expert and a witness, and it was proved most conclusively that I was the inventor of the process and not Mr. D., which meant that Mr. D.'s patent had been obtained by fraud. This made the most valuable patent ever issued in connection with electric lighting common property in the United States of America.

It seems that Edison and myself were working on similar lines, although I was ahead of him, because I made a platinum lamp before he did and beat him in the Patent Office. Edison said on one occasion that Maxim looked ahead and saw what would be necessary in electric lighting, as well as what he, Edison, would have to do in time, and then rushed off to the Patent Office and got a patent on it. He was particularly annoyed at a patent that I took out for regulating the pressure of an electrical system by connecting small wires to the conductors in the centre of the area lighted and bringing them back to the point where the current was generated, thus regulating the current, not by

the pressure at the generating station, but by the mean pressure in the centre of the district lighted. This was a very important invention; the regulator working on this plan was exhibited in Paris in 1881 and attracted a good deal of attention. It was, in fact, the invention that caused me to receive the decoration of the Légion d'Honneur.



This drawing shows a platinum electric lamp. A thin strip of platinum (*H*) is held between two clamps, and the degree that it expands before short-circuiting the current may be regulated by the thumb-nut (*I*). The melting of the platinum is prevented by the shunting of the current at *K*. It is a curious and interesting fact that when Mr. Thomas Edison first commenced to study the electric light he made an electric lamp on this plan, and applied for a patent, but an interference was declared which was decided in my favour. A lamp of this kind will give just about as much light as a red-hot poker.

Much has been said of the three-wire system. I was the first to use this in the Equitable Building, New York, and on one occasion I greatly puzzled Professor Tatum.

The first electric lights used in New York City were put up by our company in the building of the Equitable Insurance Company, 120 Broadway. At that time this great building was considered to be the finest in the world used for business purposes.

I think that the second light was put up at the New York Post Office, and the third at a large hotel erected by A. T.

Stewart and called, at first, " The Women's Home " ; but as such it was not a success. It appears that women did not like to live in a place where men were not admitted, so the big building was converted into an hotel which was afterwards known as " The Park Avenue Hotel." There was a central court, not roofed in, very much the same as one finds on the Continent of Europe ; and it was this court that I lighted with a very large arc light. A great many people came to see it, and I often went up to the hotel in the evening to study the action of the arc through coloured glass. It was apt to play about and so produce an unsteady light.

At that time the papers were full of accounts of Edison and his wonderful lamps ; not what he had done, but what he was going to do.

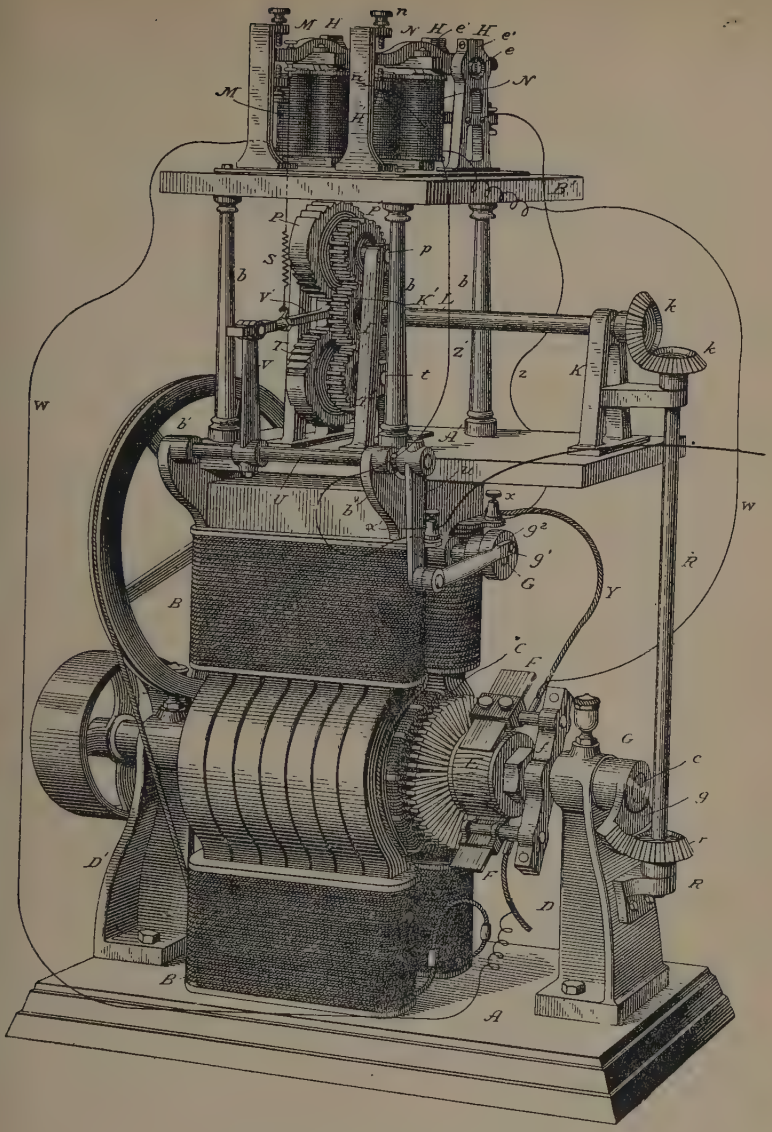
My big arc light was arranged so that it could be attended to from a second-story landing, and one night, while studying the arc, I heard the rustle of a silk dress. I looked round and there stood a vision of loveliness. The lady was robed in silks and satin and gorgeously ornamented with diamonds. Not only this, but she was extremely poetical. She looked out of the window and said : " How beautiful ! How lovely ! How much like Pompeii by moonlight ! It is enchanting ! Ah, who but an Edison could have the genius to produce such a glorious effect ! Edison is my ideal of an inventor and a man."

" But," I remonstrated, " this is not Edison's light."

" What ! " said she, " is it not the electric light ? "

" Yes, it is the electric light, but not Edison's. I do not know that Edison as yet has ever made an electric light."

" What, an electric light and not Edison's ? Then I have no further interest in it," and gathering together about forty yards of shot silk of the most splendid rainbow tints, she majestically sailed away.



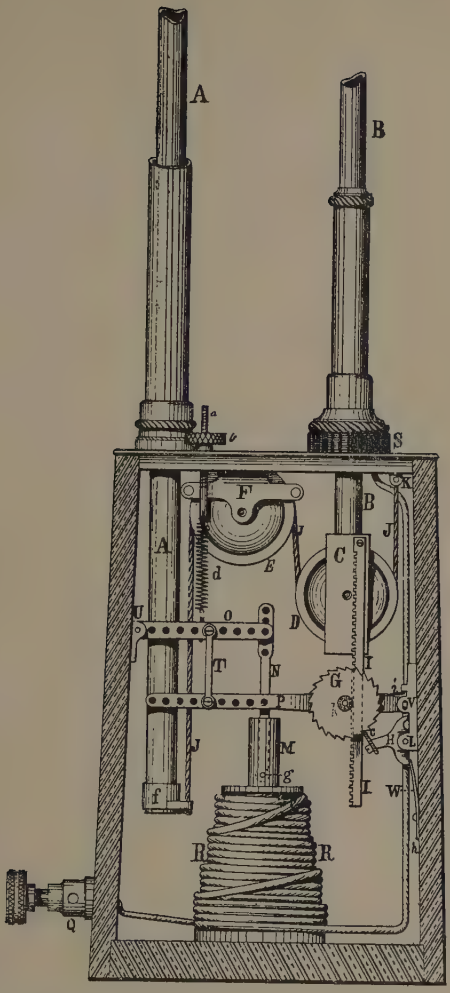
ELECTRICAL CURRENT REGULATOR

This machine was used for exciting the field magnets of a very much larger machine. The tension of the current in the centre of the district lighted controlled the magnets shown at the top of the machine. If the current was too strong, the position of the brushes was changed in the direction to weaken the current and vice versa.

Every time I put up a light, a crowd would gather, everyone asking, "Is it Edison's?" As Edison had never made a lamp up to that time, I was annoyed, and told Schuyler that the next time anyone said, "Is it Edison's?" I would kill him on the spot.

A few days later I had occasion to take a focusing lamp across the ferry. I did not even have time to wrap it up in paper as I wished to catch a certain train. I took it under my arm and ran, and succeeded in catching the boat, followed by a gaping crowd among whom I recognized an old Jersey farmer with red mud on his boots. He sat down on the opposite side of the ferry-boat and stared at me. Finally, he came over and said, "Excuse me, sir, but what is that 'ere machine—what is it for?" I looked at the fellow, and made up my mind that he had a wife and family at home, so I replied, "It is only a sausage stuffer," and thus saved the poor fellow's life. Had I said it was an electric lamp, he would at once have asked, "Is it Edison's?" and I should have killed him; but when I answered that it was a sausage stuffer he only said, "Yes, and a mighty high-fangled one, too."

On another occasion when I was putting up a large arc light, I found myself surrounded by a number of highly interested spectators. They had heard much of the electric light, but had never seen it. When everything was ready I allowed the carbons to come within an eighth of an inch of each other and asked the bystanders if anyone had a match for me to light the electricity with. A lot of them went hunting about for matches, but I took out of my pocket a nail about two inches long and said: "Never mind, I've got a nail, that will do just as well." I scratched it on my trousers, waited a bit, as though it were burning, and then applied it to the carbons. Of course, the head of the



THE MECHANISM OF MY FIRST EXPERIMENTAL ARC LAMP

The above illustration shows a drawing of a very simple form of a focusing lamp. The falling of the rod (A), which carries the positive carbon by the action of the cords (J, J), passing over the pulley (F), causes the rod (B), carrying the negative carbon, to travel half as fast as the rod (A), thus keeping the arc always in the same position.

nail had established the voltaic arc, and my amazed spectators at once found themselves in the presence of the dazzling glare of an eight-thousand candle-power arc light.

But all was not smooth sailing in arc lighting at that time. The Equitable Life Insurance Company wished to have me put a very large arc light on the top of their building, with a reflector to throw the light up Broadway. They wanted something very much stronger than had ever been made before. I therefore made a very large electrical machine which was afterwards called a double-ender, as it had two commutators and could be coupled in different ways, so as to give a current of great quantity and low tension, less quantity and high tension, or two separate currents. At the same time I made a very large electric lamp and had some especially large carbons one inch in diameter made for me by Wallace of Connecticut. Upon trying the lamp with the big current, the voltaic arc went wild; it revolved round and round, ran up on the side of the positive carbon, then snapped back between the two carbons, giving a very intense light and making a roaring noise like the blowing off of steam through a safety valve. At that time, as we did not have the knowledge which the very clever Mrs. Ayrton has at the present time, we did not know the cause of the roaring. Thinking the trouble was with the carbons, I sent for Mr. Wallace. He came up to New York, and when I started up the big lamp for him, the arc played very evenly between the two carbons with hardly any noise; the light was exceedingly steady and powerful. Mr. Wallace watched it for a full hour through coloured glasses which he held up to protect his face and eyes from the terrible glare of the light. At the end of this time he said, "It is altogether the finest arc light I have ever seen;

the generator, the lamp and the light are all right; they could not be better. It is a splendid job."

I told him that it was the first time I had ever seen it work like that. He left, congratulating me. About five minutes later, the lamp commenced to roar again and the arc to flop about in all directions. I sent a boy after Mr. Wallace, but he could not be found; he had gone. However, I did not put up the light—it was not good enough.

The success of the arc light at the Park Avenue Hotel brought us an order for similar lights and a projector for the big Grand Union Hotel at Saratoga, which was also the property of A. T. Stewart and Company.

We put up four dynamos of my own make, and our very best searchlight, such as we had already made for the Russian Navy. As the glasses in front of the reflector were always breaking, I remedied the evil by cutting them in strips, and this simple expedient seems to be used all over the world to-day.

One of the arc lights hung up in the gardens gave off a peculiar low humming sound, which, of course, was produced by the brushes running over the commutator on the machine. This, of itself, was of no account, but it certainly was very instructive to me. There were many mosquitoes in Saratoga. The male mosquito is much smaller than the female and has two feathers projecting from his head. These are very minute, but still they answer the purpose of ears; and I had read that if one were to sound a tuning fork that would give off the same note as that produced by the female mosquito, when such a note was sounded all the male mosquitoes would turn about, face the music and ultimately fly in the direction from which the sound came. As there are two hundred times as many females as males

among mosquitoes, it is not always easy to find a male. It so happened that the musical note given off by the arc light or the case holding the magnets was the proper pitch to attract male mosquitoes. At any rate after the light had been running for a few hours of an evening it was completely surrounded by male mosquitoes, facing the music and roosting on every object they could find.

I provided some of the searchlights with coloured glasses of various hues, and illuminated the fountains, which were very large and of the kind that produce a very fine spray. Judge Hilton and Mr. Clair, the manager, said that this arrangement was much better, cleaner, and infinitely cheaper than the fireworks that they had used before. But it had its disadvantages; it drew an immense crowd from the other hotels.

I was asked if I could put some kind of a reflector round one of the arc lights placed over the balcony. Of course I had to improvise something very quickly and cheaply, so I made a big wooden box like an exaggerated bath tub, lined it with bright sheets of tin, and hung the big arc light inside it. It answered the purpose very well, giving a diffused light of great power. Unfortunately, however, a certain kind of beetle, hemispherical in shape, and about the size of half a hazel nut, took a particular fancy to this light. Numbers of these beetles managed to get into it and have their wings burnt off, whereupon they fell down and crawled all over the balcony, very much to the horror of the ladies. Fully a peck of them came down the first night, and the manager thought we should have to discontinue the use of the light. The next night only about half a peck fell, the third only about two quarts, the quantity continuing to decrease until only about half a pint a night came down, which was not enough to worry about.

These lights attracted so much attention and brought so many customers to the hotel that another searchlight was ordered to be placed on the top of the high central tower, which I think was about one hundred feet above the street. The first night that this light was put up, I managed it myself, throwing the light in every direction. The next night an officer of the U.S. Coast Survey came up from the Balston Spa, seven and a half miles distant, and told me that they saw a flash of light which only remained an instant and disappeared, and was very bright. He asked me to turn the light in that direction at exactly nine o'clock that night. He pointed out the direction of Balston Spa and with his knife cut a notch in the railing for my guidance. That afternoon I went out and purchased some pure lamp-black; not the material that is sold under that name in England, but what is known as such in the States, and in France as "noir de fumée"; also a quantity of alcohol and some chamois leather. With these I gave the reflector a very fine polish, cleaned the glass, and got everything in readiness. Shortly after that there came up a little thunder-shower, one of the snappy kind that does not last long, but it cleared the atmosphere of every particle of dust.

As soon as it was dusk I climbed up on to the tower, started the light, and turned it on to a very large white building that was about three-quarters of a mile away. Then I commenced to make adjustments. I placed the positive carbon in such a position that the crater faced the back of the reflector, and then by turning the various screws I arranged everything so that the highly illuminated spot on the big white building was as small as possible; in fact, if I mc l any of the adjusting screws in either direction the spot was made larger. I knew that this could not be im-

proved. I made a little hole in the side of the reflector about the size of a cambric needle, and a few inches from this I had mounted a small piece of ground glass. By this arrangement the image of the carbons was projected on the ground glass very distinctly, and with a lead pencil I marked their position. This made it easy to keep the carbon always in the right place to produce a maximum result.

While I was conducting these experiments, a message was sent up to me, asking if I were not afraid of setting the wooden tower on fire by the sparks thrown off by the electric light. I replied that there were no sparks. The sparks complained of were nothing more nor less than the insects in the air.

At exactly nine o'clock I turned the light round in the direction of Balston Spa. I carefully adjusted the carbons so as to make the image appear in exactly the same spot on the ground glass that I had marked with a lead pencil. The air was wonderfully clear ; the path of the light through the air was not visible ; there was no dust or vapours to illuminate. I kept it in position for fifteen minutes and soon received a telegram from the officer which read as follows : " The light is very strong ; we can see to read by it and it casts deep shadows." As the distance was seven and a half miles I do not think that this record will ever be beaten in Europe, where the air is so full of dust and vapour that very little of the light is left at a distance of seven miles.

Orders were given that the light should be turned on to the train every evening, and one evening Judge Hilton, being on the train, heard the passengers make inquiries as to where the light came from ; they then ordered their baggage to be sent to the Grand Union Hotel. This was very good, but the Judge was not quite satisfied ; he wanted something still more startling.

I had exhibited a powerful searchlight at Rochester one dark night. The air was clear, but there were dense low-lying clouds, so that when I threw the light on the Goddess of Liberty on the top of one of the high buildings, a black image of the Goddess appeared on the clouds, which was quite startling. An account of this appeared in the newspapers and Judge Hilton had seen it. He therefore caused a telegram to be sent to me as follows :

" Can you make a magic lantern that will throw images on the clouds ? "

I replied, " Yes, if there are any clouds."

Then came another telegram :

" How long will it take to make it ? "

I replied that I could have it up in a week if desired.

A telegram came back :

" Very well, make it at once."

I then went out in search of a lens and found one about eight inches in diameter. I made a wooden magic lantern of great size, equipped with an eight-thousand candle-power electric light, and had it up inside of the specified time. When there were no clouds, we threw images on the spray of the fountains, but it did not make a very good screen. It was very seldom that any effect could be produced on the clouds, on account of the absence of clouds sufficiently dense for the purpose. Still, the big magic lantern attracted a good deal of attention, and I returned to New York, everybody being satisfied.

CHAPTER XIII

IN the beginning of the winter following these events Edison came out with his incandescent lamps, and when Mr. Schuyler and his associates saw what they were they said to me: "That is the exact thing that you wished us to make years ago"; and they ordered me at once to resume the work that I had so long neglected.

At that time my dynamos and arc lights were being made at Bridgeport, Conn., where I was in charge of the work. I at once employed a glass-blower, and very soon produced the first good incandescent lamps that were ever made. All the filaments were standardized by my process, a process which is universal throughout the world to-day.

It is absolutely impossible by mechanical means to make a carbon filament that is of uniform resistance throughout its whole length. When carbons are heated in a vacuum, the parts where the resistance is the greatest become the hottest, and these very soon give way. All Edison's original lamps had this irregularity in the conductivity of their carbon; and although he searched the world over he found nothing that would prevent the trouble, except by the process which I had invented. His first lamps were not treated in this way; consequently, to make them last only a few days, he had to be very careful not to make them too hot. They were therefore so very dim as not to be compared with the lamps of to-day.

As the light given out by a heated body increases as the

fifth power of the temperature, it follows that only a slight augmentation of heat greatly increases the light, therefore my lamps gave fully twice as much light for the power consumed as Edison's original lamps.[1]

It will now be necessary for me to go back a bit and recapitulate the troubles that I had in making my first lot of incandescent lamps. In the first place it was very difficult to find glass-blowers sufficiently skilful to make the pumps and the lamps. It required phosphoric anhydride to absorb the aqueous vapours in the lamps and pump, and I found that Edison had purchased all there was in the country. Upon inquiry I learned that this rare chemical was made in Germany by the following process: The chemist obtains a large glass jar with a side outlet near the bottom. He places a little platinum cup at the bottom of the jar, with a piece of asbestos interposed to protect the jar from the heat, the asbestos being previously heated to get rid of the water that it contains. The chemist, having a large supply of oxygen at his disposal, passes it over strong sulphuric acid to deprive it of the last trace of water, and this dried oxygen is conducted by a rubber tube to the side outlet of the bottle. The next process is to place sticks of yellow phosphorus in warm water so that they may be easily cut. The operator then cuts off thin bits of the phosphorus, removes them from the warm water on the point of his knife, at once touches them to blotting-paper, and then dips them in strong alcohol; again he touches them to blotting-paper, and then drops them into the platinum receptacle at the bottom of the bottle. He starts the fire with a red-hot iron wire, and keeps it going the whole

[1] Some of these first lamps made by me were sent to Sir William Crookes, and twenty years later he told me they were the best lamps he had ever seen.

day by dropping in through a tube small bits of dry phosphorus. As the phosphorus burns in pure oxygen we have P_2O_5, with a trace of yellow phosphorus that has escaped the fire. The product of combustion sublimates on the sides of the bottle, and at the end of the day it is scraped off, great care being taken that no moist atmosphere comes in contact with it; it is usually of a pinkish yellow or a light lemon colour. In theory it should be absolutely white. When this has been collected with great care it is treated with carbon bisulphide, which has the property of dissolving phosphorus, and this process removes sufficient of the unburnt phosphorus to make the product appear a much lighter yellow.

At that time a pound of phosphoric anhydride made in Germany cost twenty shillings. As it was necessary for me to have this chemical, I first tried to have it made at the chemical laboratory at Yale College; but as they would not undertake it I tried, simultaneously, Harvard College, the University of New York, and the University of Pennsylvania, as well as some of the well-known chemists in New York, but they all refused to undertake it. I then approached Professor Stirling, a local professor of chemistry, and he agreed to make the chemical for me. When he had been working on it about ten days he came to me and told me that he thought he would have to give up the job. He, however, produced some dark brown substance about the size of a pea from a small bottle. He said: "That's the stuff, but it is very impure." He placed it on a pine board and put a small drop of water on it, when it hissed, got very hot, and burnt the wood.

This was about five o'clock in the afternoon. I at once commenced to study the subject, but I had not the remotest idea what I should do until after I had gone to bed at night.

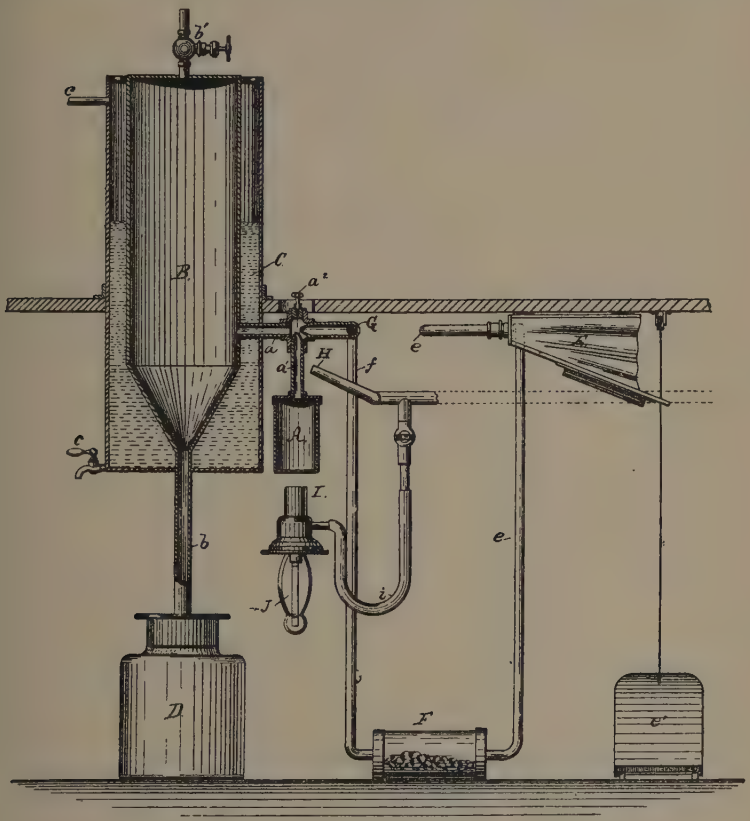
It then occurred to me that I might make this rare chemical by some new process, and not use oxygen gas at all, other than that found in the atmosphere. I had already found the boiling-point of phosphorus; it was not high. I also knew that the vapours were six hundred times less dense than the metallic phosphorus. It seemed to me that if I first converted the phosphorus into vapour at a high temperature it would not require anything like the same volume of oxygen to consume it, and the combustion would be much more perfect. By twelve o'clock I had settled the whole question and went to sleep. I rose at four, got something to eat, and at five o'clock was at my office. I made the drawings, put on the dimensions, and at 7 a.m. I had the drawings in the biggest tin shop in the place. My system consisted of a very large tin reservoir having a funnel-shaped bottom with a very steep incline. A part of this was surrounded by a water jacket with a connection soldered in that fitted a one-inch iron pipe. I dried my phosphorus by turning all of the water out of the bottle in which it was contained, filling the bottle up with alcohol, which absorbed the water, and then draining off the alcohol. I then put the whole into a large wrought-iron mercury bottle and attached it to my apparatus. It was so arranged that by heating the mercury bottle the vapours of the phosphorus escaped through a jet one-sixteenth of an inch in diameter, when they came into contact with a jet of dry air a quarter of an inch in diameter. The air was furnished by glass-blowers' bellows, and was dried by passing through a long and large tube containing calcium chloride. The apparatus was started up at ten o'clock at night, and the iron tube in which the combustion took place was soon red-hot. I had provided myself with a lot of wide-mouthed glass bottles, thoroughly dried and corked, as well as a quantity

of melted wax. When the apparatus had been going about ten minutes I rapped the sides slightly, and a litre bottle that was attached to the bottom was very soon filled with phosphoric anhydride, snow white. I corked it, dipped the neck in wax, and put it aside. I then replaced another, and continued to fill a bottle a minute, until all my phosphorus was consumed.

While this work was going on Professor Stirling called. He was rather astonished, and when finished I informed him that I proposed to show my confidence in the purity of my chemical. I said that phosphorus is a violent and deadly poison but that when combined with all the oxygen it will take up it is not a poison at all. I put some of it in a glass with a little sugar and water, stirred it up, and drank it. Professor Stirling said: "If you never do another job in your life this ought to immortalize your name."

It was the first time that pure phosphoric anhydride had ever been made, and, moreover, made by a single process. The cost was not over one-tenth part of that of the impure article made in Germany. Since that time none of this interesting chemical, which has such a wonderful affinity for water, has been made except by my process, which was the subject of a patent. On the occasion mentioned I made enough to last for a long time, but when I made the next lot I did not use the mercury bottle; I used a big U-shaped piece of iron pipe, heated one end of it very hot with a Bunsen burner, and made the other limb just hot enough to boil water. Near the top of this I had a connection where I admitted coal gas, but did not light it. The coal gas, of course, kept the atmosphere out of the tube. I was then able to take the sticks of phosphorus directly out of the water and drop them into this limb of the U-tube. They very soon melted and the water was evaporated,

escaping in steam, while as the melted phosphorus rose in the other limb of the U-tube, which was very hot at the top, it was evaporated, and the vapours escaped and were blown



APPARATUS FOR PRODUCING PHOSPHORIC ANHYDRIDE (P_2O_5)

This apparatus was made in a single day, and produced phosphoric anhydride, perfectly pure, at the cost of one shilling per pound.

into the combustion tube by a jet of dry air. Of course, the atmospheric nitrogen escaped at the top of the receiver through a hole about an inch in diameter. It was necessary

to have the receiver of great size in order to give time for the anhydride to sublimate on its walls.

When I came to make the third lot I had for assistants several of our cleverest young men, one of them being a chemist. I wished them to see how the chemical was produced, so that they might make it themselves. Later on, when I was ordered to go to Europe, I wanted to be sure that they could really make the stuff, so set them at it. They worked on it for about three days without producing an ounce. I then tackled the job myself and filled two hundred bottles, one litre each, in two hundred minutes; some of these I took to Paris with me.

Notwithstanding that I was busily engaged in making electric lighting apparatus, I was not altogether free from the great firm of A. T. Stewart and Co., who considered me as their consulting engineer. One day I received a telegram from Mr. Prothero, the manager of their carpet factories, requesting me to call at his office. I did so, expecting that they wanted some more electric lights. But no.

"We are having a lot of trouble at our Catskill carpet factory," Mr. Prothero said, "and we want you to go up, find out what the trouble is, and put everything all right."

I said: "If it is anything that relates to the machinery boilers or a waterwheel I can attend to it."

"No, it is not any of these; it is a trouble in the weaving of the carpets."

I replied that I had never been in a carpet mill in my life, and knew nothing of it.

"But it is our orders that you go there and straighten things out. The man in charge is a Frenchman, and a very good fellow; he has had great experience, but he has a trouble now that he does not understand."

Still I objected, saying: "Suppose I should apply and say I have come up to straighten things out in the carpet factory, he would naturally ask me what experience I have had; I should have to say 'None.' What would he think or say?"

"We don't care what he would say," he persisted. "Our orders are that you go to the Catskill mills, find out what the trouble is, and correct it—that is all."

On the afternoon of the next day I found myself at this big carpet factory. The Frenchman met me at the door and received me very kindly. Of course, I apologized and told him exactly what had happened. I asked him what the trouble was, and he said, "I will show you"; so we went into the carpet mill together. The kind of carpet being made was what is called Tapestry Brussels, in which the coloured warp is of woollen, each particular strand being of different colour in different places. He told me that it was necessary that all of these coloured woollen threads should keep pace with each other so as to form a proper figure, but unfortunately some were considerably longer than others, and an additional price had to be paid for the weaving if the threads had to be cut and adjusted during the process of weaving. He showed me how the yarn was laid out on the floor, coloured and stamped, but the pattern was so elongated that it was impossible to see what it meant. When the colour was comparatively dry, the yarn was placed in a very large cylinder, the door closed airtight, and steam let in. The steam-heating fixed the colour. The yarn was then removed and the surplus colour washed out of it in a large body of water.

I began to see a little light, so I asked the manager if the yarn did not shrink a little in the steaming.

"Yes, it shrinks a good deal," was his reply.

I asked him then if it would be affected by the pressure of steam and the time it was steamed.

" It certainly would ; that is self-evident," said he.

I then saw them do a batch. A boy of about fourteen turned on the steam, until a pressure of four pounds was indicated on the gauge ; it was a small gauge and not suitable for recording low pressures. The boy was supposed to keep his eye on the gauge, watch the clock, and at the end of twenty minutes to turn off the steam. I saw at once that there was a chance of a good deal of error ; the gauge was not sensitive enough, the boy was not careful enough, and he might not be a sufficiently good mathematician to compute twenty minutes, especially when the minute hand passed over number twelve on the clock face.

I then returned to Bridgeport, Conn., made a working drawing, and ordered a steam regulator to be made ; not in our own works, however. I ordered a clock with an electric apparatus attached to it, two bells, and a battery. The steam regulator was provided with a balanced valve, so that it would not be affected by a changing boiler pressure, the valve being operated by a rubber diaphragm, which was underneath instead of on top of the regulator, and in action would be covered with condensed water and be quite cool.

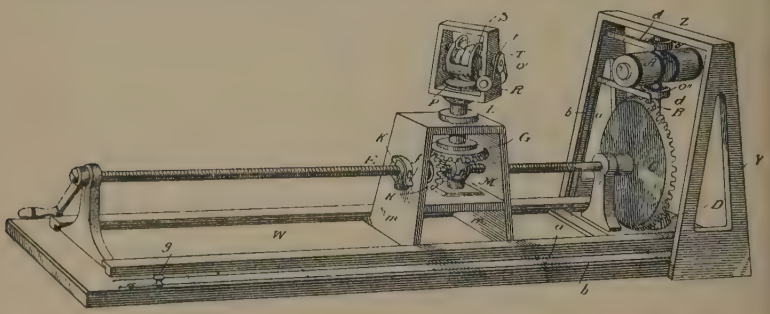
In running the apparatus the minute hand was placed at 12, and at eighteen minutes past twelve the moving hand established an electrical current, and set a little buzzing bell ringing ; at the end of twenty minutes a big gong sounded and the steam was at once shut off. This completely cured the trouble, and later on the Frenchman said to me : " If I should tell any of the carpet makers in my own country of the trouble that I had, and that an American engineer who was never inside a carpet mill before in his life

came here, found out the trouble in five minutes, and in a few days made and put up an apparatus that completely cured it and made the yarn better than I have ever known it before, they would not believe me."

While I was going about Stewart's mills on various jobs I noticed that some of their wool was extremely greasy, and the foreman told me that it required a lot of soap and water to get the grease out of it. I asked them to give me an exact pound of the wool, from which I extracted the grease, generally known as Lanoline, and found I had exactly four ounces of a bright, amber-coloured, thick oil. As all animal oils were high-priced in the States, I showed them that they were washing away many thousands of pounds' worth of grease in a year which might be recovered at a comparatively low cost. As the process required the use of inflammable liquid they were afraid to try it. Later on, however, others took it up and made a big thing out of it.

When electric lighting first came into use in America, everyone wanted to examine the machines that produced the current, and many of these sightseers had high-priced watches, which of course became magnetized and stopped. No watchmaker was able to remedy the trouble, and a convention of watchmakers was held in New York. It was decided that the only way out of it was to have all the steel parts replaced: but as many of the finest watches were made in Denmark it was difficult and costly. Mr. Leet, of Bridgeport, Conn., was on the train from New York when he met some of the Boston watchmakers on their return from the convention. He told them he knew a man whom he believed could take the magnetism out of watches, and a few days later one of them sent him the steel works of a Danish watch, the cost of which had been three hundred

dollars. The parts were packed in a little pasteboard box. I found them all strongly magnetic. I attached a bent copper wire to the box so that it formed trunnions, spun it near the south pole of a dynamo, then a little further from the north, and again still further from the south. I did this many times, each time increasing the distance, until I was four feet from the magnets. On testing the parts with soft iron filings it was found that they were all com-



MACHINE FOR DEMAGNETIZING WATCHES

This machine is provided with a very powerful electrical bar magnet that rotates on a vertical axis, presenting the North and the South Pole to the watch in rapid succession. The watch is placed in the carrier very near to the magnet, and rotates on a vertical and horizontal axis at the same time. As the crank is turned the carriage holding the watch is slowly withdrawn from the magnet by the action of the screw, and by the time it has reached the limit there is not a trace of magnetism left in it. Many thousands of watches were demagnetized by this apparatus.

pletely demagnetized. Mr. Leet sent the parts back to the watchmaker, who pronounced them completely free from magnetism. Shortly after this watches came in in shoals. I charged one dollar each, but it took too much of my time, so I made a machine that anyone could use that would demagnetize any watch without taking it out of the case in one minute of time. This did very well until the alternating current came in, when anyone could demagnetize a watch in five seconds.

While I was making my electrical machinery and lamps at Bridgeport, Conn., I used to hear a great deal of the exploits of the young men at Yale College in the neighbouring town of Newhaven. Some of these were so remarkable that it may be interesting to cite an example.

On this occasion there had been a death in an Irish family. The bereaved widow was visited by a very nice young gentleman from the College. He told her that the students were very anxious to learn the manners and customs of as many different nations as possible, and that he had been sent as a committee of one to see if arrangements could not be made whereby it would be possible for the young gentlemen to take part in the ceremony of the wake. They were quite ready to furnish all the refreshments that might be necessary for the occasion, which of course included an unlimited supply of tobacco and whiskey. The widow did not object at all, but communicated with all her friends, asking them to come and take part in the proceedings, assuring them that there would be no lack of whiskey and tobacco. This being settled, one of the young gentlemen called on the local undertaker and found that he was quite prepared to furnish twenty coffins of the cheaper sort, and it was arranged that at one o'clock in the morning following the wake the coffins and a lot of candles with sufficient men should be sent to the house. Active proceedings commenced at the wake about nine o'clock at night. A large number of the students were present, and the supply of liquor of various kinds was all that could be desired. The drinks were not confined to whiskey alone; there were mixed drinks of all kinds, in which Jersey Lightning (Apple Jack) played an important part. The College boys acted as waiters, pressing everyone to drink as much as possible, and at one o'clock when the coffins arrived everyone was

dead drunk, whereupon the students and the undertaker's men placed them in the coffins, screwing down the principal lid,[1] with numerous candles on top of each. Of course, only the face was exposed.

I think it would have been interesting to have seen what took place the next day, when those that were only dead drunk came to life; there must have been a very lively time at the resurrection.

One word about Jersey Lightning. A college professor in New Jersey showed me in his laboratory a quantity of this potent liquid. He said, "You can analyse it and you will find that there is nothing in it except alcohol and water; still, if you drink it, it has a most remarkable effect—why is it?" Later on, however, it was discovered that the extraordinary potency of this fluid was due to the minute quantity of prussic acid in the seeds of the apples from which it is made.

When it was finally decided that I was to go to Europe to represent the Company at the Paris Exhibition of 1881, it became necessary to hire a new engineer to take my place in New York. At that time our Company was known as "The United States Electric Lighting Company," and we had large premises on Avenue B. As I wished to make a good show and produce the greatest possible amount of light for a pound of coal consumed, I naturally sought for the best engine and boiler in the market. I found that Messrs. Babcock and Wilcox had taken first prize at the Centennial Exhibition, and that they had created a new record in the quantity of water evaporated by a pound of coal. I therefore purchased a pair of their large and fine boilers; and wishing to have an engine that was very

[1] At that time coffin-lids were in two pieces. The principal lid covered the body and a small lid covered the face and neck.

economical and steady, I bought a Corliss engine with two cylinders, so that there was a steady pull all round. This plant was the best known at the time.

And now something happened that in reality is the curse of doing business; something that afflicts both England and the United States. The incoming man wished to prove his wisdom by attempting to show that his predecessor was a fool. He said I had made a great mistake and wasted a lot of the Company's money. He said it was a *sine qua non* that we should make the best possible showing, and obtain the greatest amount of light for the coal consumed, therefore we must have the best boilers; and he ordered the Babcock boilers to be taken out and replaced them with a pair of very large Lancashire boilers. I had not been very long in Europe when the United States Electric Lighting Company absorbed the Weston Company, of Newark, New Jersey; they wanted still larger premises, and the place at Newark could be made as large as they liked. They therefore gave up the Avenue B premises and moved the machinery, and in fact everything except the boilers and engine, to Newark. In the meantime Edison was looking for a place where he could show his lights in New York. He took over our lease, and as he too was anxious to make the best possible showing, and as in order to do so he must have the best boilers, he ordered out the old-fashioned Lancashire boilers and replaced them with a pair of Babcock and Wilcox boilers exactly in all respects like those which had been removed only a few months previously.[1] This sort of thing has dogged my steps from that day to this.

[1] At that time Mr. Spencer D. Schuyler was still the president of our Company. He opposed the change of the boilers, but was overruled by the directors, whereupon he resigned.

CHAPTER XIV

ON the 14th day of August, 1881, I embarked on the s.s. *Germanic* for Liverpool. Eight days later I arrived in Liverpool, and at ten o'clock that night was at Charing Cross Hotel. I ate my first whitebait and saw the Thames for the first time. I was rather surprised to find how very small it was. The next morning I took the train and arrived in Paris in time for dinner, after which I visited the Electrical Exhibition and found that our men were putting up the electrical apparatus.

A few days after my arrival I received orders from New York to examine carefully every exhibit of an electrical nature and describe it in my own words, and to collect all the circulars and pamphlets and send them to the Company. I did this with the aid of a shorthand writer, but it took a very long time. When I had finished they wrote to me that I should examine and describe every electrical patent in the Patent Office, from the year one down to the present date. Of those that were unimportant I only made a short abridgment in English, but the important ones I had copied verbatim in French. I had two secretaries and two draughtsmen to assist me, and things went on merrily for a long time.

One little French draughtsman that I had was a curious character. In the greater number of early French patents electrical wires on magnets are coloured green. The green is made up by the draughtsmen themselves of gamboge

and Prussian blue; as the drawings were on tracing linen, which has a great affinity for gamboge, the gamboge slowly spreads out, colouring the cloth about the drawings yellow, so that the magnets all seemed to be surrounded by a yellow halo. This draughtsman would persist in putting in the halo, and his dignity was greatly offended when I told him the story of the Chinese tailor who made a pair of trousers for an Englishman with a patch on the seat.

It was a rather long and tedious job, and when it was finished they asked me to go to the Conservatoire des Arts et Métiers and copy everything electrical at that establishment. When this was finished I was sent to Brussels, where I examined the Belgian patents in the same manner as I had examined the French.

I would say for the information of those interested in such matters that the Belgian Patent Office is not *quite* so large as the American Patent Office at Washington.

My researches in these patent offices enabled my Company in America to head off and defend themselves against a considerable number of lawsuits that were being brought against them for infringing previous American patents.

At this time I was engaged by the United States Electric Lighting Company at a salary of £1000 a year, and had a large number of shares in the parent Company which had established the Maxim-Weston Company in London, a company that was to have the control of all the Maxim and Weston patents for the British Isles. Their office was at 47 Cannon Street, and they had works at Bankside, on the Surrey side of the Thames. The home Company sent me out a new agreement to sign. They told me that the London Company was not making any progress at all and that they wished me to go to London, reorganize it and put

it on its feet. They informed me that they had made arrangements whereby the London Company would pay half of my salary while they would pay the other half. I accepted, and a few days later it was announced in the English newspapers that " Hiram Maxim, the greatest electrician in the world, had been engaged to come to London to reorganize the Maxim-Weston Company." This was the occasion of a great deal of ridicule. Though I never had pretended to be the greatest electrician, or even a great electrician, yet some of the British papers, especially the technical ones, were very severe.[1] They naturally asked, " Where are Sir William Thompson, Edison," etc. etc. However, I came over to London, bag and baggage, ready to enter upon my new duties.

I first turned up at the factory at Bankside, and was met by the Secretary, Mr. O'Brien. I had never seen anything like it in my life. The place was unspeakably dirty, everything was so out of order that we were tripping over copper wires everywhere ; the windows were so thick with dirt that they admitted little light ; and the few men at work were burning gas out of the open end of the pipes without any burner. In walking about the place I saw a high-priced Brown and Sharp's milling machine. It was all smothered with dirt and appeared to be in a very dilapidated condition The roof was leaky and the machine had been rained on and was slightly rusty in places.

After we had examined the factory thoroughly I started to walk over the bridge with Mr. O'Brien. When we were alone he said, " Maxim, you are an American, I am an Irishman ; when we were starving in Ireland, the Americans sent us a shipload of food ; the Americans are and always

[1] I afterwards found that this extravagant announcement originated from someone who was endeavouring to sell his shares.

have been our best friends, and I will not see you imposed upon. Have you seen the Managing Director ? "

I said: " No."

" Well, wait until you see him ; he is a sight. We do not intend to do any real business. Everything that we have got that will bring in a penny will be sold, and the money absorbed in paying big salaries, and for patents which have been taken out on purpose to be sold to us and are absolutely of no value."

I asked him if it would not be possible to get the shareholders together when he could place before them the true state of affairs.

He said: " No, they are absolutely disgusted with the management, and will have nothing more to do with the Company."

Later on, I saw the Managing Director, showed him the papers that I had received from New York, and presented to him the agreement that he was to sign. He declined to sign the agreement, saying the Company could not pay such a high salary.

" But," I said, " I have agreed to stay in London two years and take charge of the Company."

He said: " All right, but the salary is too high."

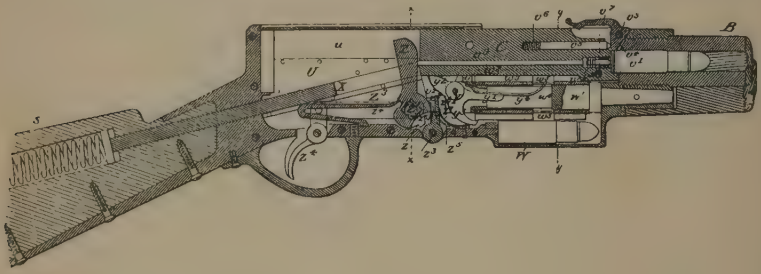
I then asked him what he would consider a proper salary for my services, and he suggested *one guinea a year.*

Before leaving Paris I had made the first drawing of an automatic gun, and it occurred to me that this would be a very good opportunity for me to commence experiments.

Having obtained permission to experiment in the Company's factory at Bankside, I cleared up a bench and scraped the filth off two or three windows, to let in a little of God's sunlight.

I observed a very curious state of affairs in this factory.

I think about four or five men were employed; two of them appeared to be working on arc lamps, and at the time were turning the steel rods that connect the lower part of the lamp with the top. The leading hand had rigged up an electric bell in such a manner that when the cut was finished contact was made, and the bell was rung. He then set the lathe to run at its slowest speed with the finest feed, laid down on the bench and went to sleep. On the ringing of the bell he would get up, reset the lathe and again go to sleep. The other lathe hand did the same thing, but as he



THE FIRST DRAWING OF AN AUTOMATIC GUN MADE IN PARIS

This drawing was made in Paris and shows a rifle with a magazine, the cartridges being arranged in a cylinder.

had no bell, he placed a large iron bar in such a position that it would be thrown over by the carriage of the lathe at the end of the cut, and fall on the floor, making a loud noise.

All this was very ingenious and well calculated to make a job last. It only required a very small quantity of work to keep these two men fully employed.

While I was there an enormously large gas bill came in. The Managing Director objected and appealed to me. I told him that the windows were so dirty that it was necessary to use gaslight, and as there were no gas burners the

men burnt the gas out of the open end of the pipe, which was rather expensive.

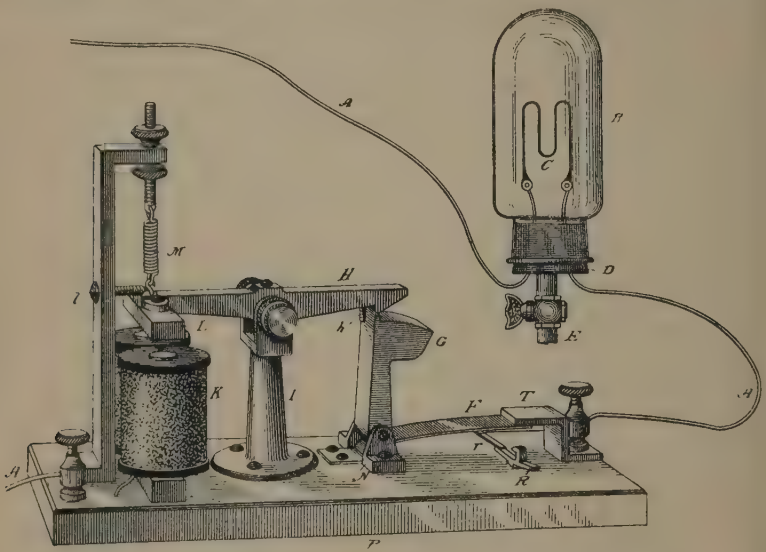
I had not been there very long when the Managing Director said to me that if I wished to occupy the premises it would be necessary for me to pay rent, which he fixed at so high a figure as to make it absolutely impossible for me to remain ; so I hired premises at 57D Hatton Garden, at the corner of Clerkenwell Road. I had previously hired a room in Cannon Street, where I had made drawings of a machine gun.

The Maxim-Weston Company at that time owned all of my English patents on electrical appliances, among which was the only system ever discovered of making good and reliable filaments for incandescent electric lamps ; my patent was for treating the filaments by heating them electrically in a highly attenuated atmosphere of hydrocarbon vapours, the vapours of gasoline preferred. The Managing Director failed to pay the annuity on this patent, and it lapsed.[1] One of the greatest of our English electricians, knowing its value, attempted to get possession of it and to have it revived at the Patent Office by paying the fees and the fine, but he was a few days too late. This patent, which was the most important one that had ever been taken on incandescent lighting, became common property in England as well as in America. It was exceedingly valuable because it was impossible, and is still impossible, to make carbon filaments for incandescent lamps without its use. It was certainly worth £200,000 a year.

Had I not been paying so much attention to guns, I might have purchased this patent from the Company and

[1] Previous to this I had interviewed the Directors of the Company and attempted to get them to take some action in regard to the affairs of the Company, but nothing I could say seemed to have any effect upon them.

made a lot of money out of it. If the Managing Director had signed the necessary papers and put me in charge, I should have been able to pay a dividend on the Company's



APPARATUS FOR THE TREATMENT OF CARBON FILAMENTS FOR INCANDESCENT ELECTRIC LAMPS

The carbon is mounted in a highly attenuated atmosphere of hydrocarbon gases and the current turned on. As it becomes heated the weakest part of the carbon becomes the hottest, and is the first to be built up from the carbon of the surrounding gases. As the carbon increases in cross-section and density the resistance is reduced, and when the right resistance is reached the current operating on the magnet releases the hammer (*G*), and breaks the circuit. An English judge has said that this is the process that made incandescent electric lighting possible.

shares of at least a hundred per cent. out of royalties that I could have collected from other companies.

While I was working on the gun drawings at 47 Cannon Street, I advertised for an assistant draughtsman, and I was surprised at the number that applied. They were indeed a job lot, many of them down at the heel and out at the elbow. I had already hired a little German by the

name of Silverman to act as a kind of clerk and man-of-all-work. He was a very active little fellow and very officious, and he suggested that these draughtsmen should be admitted one at a time and pass some sort of an examination.

I thought of something very simple, so I asked them how many square feet there were in a square yard. Some thought there might be six or seven, only about half of them giving it as their opinion that there might be nine. This reduced the number of applicants by one-half.

The next question was, " How many cubic feet are there in a cubic yard ? " Only about a dozen were able to answer this question. Then I asked them to compute the volume of a cylinder ten inches in diameter and ten inches high. This knocked them all down but two. Only one Englishman was able to answer this poser, and he was quite unable to draw ; but there was one who knew quite as much of mathematics as I did, if not more. He was a Dane, a good draughtsman and a thoroughly good fellow, but altogether too modest to take a leading part. However, he remained with us many years.

One day, while I was drawing in my office, Captain Rapieff, a Russian naval officer, came in. I had known him in Paris, where he had an electric lamp on exhibition known as the Rapieff lamp. We were great friends in Paris, and I believe I had met him also in New York. The young Russian officers were much given to horse-play, so as soon as he had greeted me, he clinched me and attempted to throw me down. He was an extremely tall man, fully six feet two inches. I at once gave him my favourite Irish hoist,[1] whereupon suddenly the Russian's big boots were in the chandelier, making it very lively for the glass. But I did not put him on the floor ; I simply held him with his

[1] Cross-buttock in England.

legs up and allowed him to kick. Silverman was much astonished. He said he had often heard and read of wrestlers throwing their opponents over their head, but had never believed it was true. Now, however, there could be no question about it ; he had seen it himself.

I would say that Silverman took great interest in the work. He was very anxious to learn to draw, so I allowed him to make a few tracings, then purchased him some instruments, and he ultimately became a very good draughtsman. He acted in various capacities, and at the time of his death was the manager of one of our smaller factories.

Having finished my drawings of the first automatic machine gun, I went vigorously to work to equip my little factory in Hatton Garden. I lost no time in purchasing the dirty and rusty milling machine that I had seen at Bankside. As no one seemed to know what it was worth or what it was for, I got it for about a quarter of its value, and when I came to clean it up I found that it had never been used ; it was still covered with grease. After being cleaned, and the few specks of rust rubbed off, it looked just as good as the day it came from the makers. I also purchased some American lathes, planers, drill-presses, etc., and was soon in full swing.

I started with two mechanics ; one a skilled Birmingham gunmaker and the other an expert lathe hand. Having put these to work on an experimental gun I was called away to Paris, on business connected with the United States Electric Lighting Company. While I was away absolutely nothing was done. I scolded the gunmaker very much indeed, threatening to discharge him. Shortly after this, the lathe hand smashed the feed gear of a beautiful American lathe. He put the screw feed and the slow feed in together, and as the carriage could not travel at two speeds at the same time something had to break.

I discharged this man, and no sooner had he gone than the gunmaker came to me. He said, " You appointed the lathe hand, J. N., as the leading man, and he therefore became my boss ; I had to obey his orders. You were greatly upset because no work was done while you were in Paris ; I was doing my utmost, but you had not been gone very long when J. N. came to me and said : ' Never finish one job until there is another in sight. You are working the bread out of your own mouth ; you are working the bread out of my children's mouths. Slow up, you fool.' " This was an " eye-opener " to me, and I saw the kind of men that I should have to deal with.

There was an engineering shop next door which assisted me in getting my tools into position and in equipping my new establishment. The proprietor, however, shook his head and prophesied disaster. He said there was no money to be made with such tools as I had ; they were too expensive, and it would be difficult to get men in London who would understand them.

I went to the Henry Rifled Barrel Company to get some gun-barrels made. When I told their old Mr. Pervis, the superintendent, what I was at, he said, " Don't do it. Thousands of men for many years have been working on guns ; there are hundreds of failures every year ; many engineers and clever men imagine that they can make a gun, but they never succeed ; they are all failures, so you had better drop it, and not spend a single penny on it. You don't stand a ghost of a chance in competition with regular gunmakers—stick to electricity."

This was certainly very encouraging. However, I said to him, " I am a totally different mechanic from any you have ever seen before—a different breed."

He gave a deep sigh in reply, and made and delivered the barrels.

I took my drawings to a local pattern-maker and described them fully to him. As I was in a great hurry he agreed to deliver the patterns directly to the brass foundry and have the castings sent to me. They were about the worst castings I had ever seen ; I could actually see the grain of the wood in them. So I examined the patterns, and found that they had been made out of coarse, unseasoned deal, and that they had already changed their shape in seasoning. I then ordered a new set of patterns, with instructions that they were to be made out of hard, sound, and highly seasoned mahogany, that the dowels of the core-boxes should be of brass and that the wood should be thickly shellacked ; this was done. I delivered them to the foundry, giving instructions that I wanted the best possible gun-metal castings.

A few days later, while in my little office, I was told that a truckman had arrived and delivered some brass castings. He came to my office and delivered the invoice, and I was amazed at the weight of the castings. On going into the shop I saw them piled up on the floor ; everything had been cast solid ; nothing had been cored ; even the core-boxes had been cast in solid gunmetal. As these core-boxes had been varnished all over to keep out the damp, the foundryman had imagined that they themselves were patterns. I ordered a new set, and this time I got them all right. The patterns were well made and expensive, but I found that they had been very badly used in the foundry, knocked about, bruised, and broken. On remonstrating and discussing the matter with my men, I learned that the damage was done purposely, as they said it was good for trade ; it gave something for the pattern-makers to do in repairing the patterns.

Having occasion to use some metallic mercury, I sent

my man Silverman out to purchase " one pound of metallic mercury in a strong glass bottle with a cork stopper." Had I not specified glass I might have got an expensive iron bottle, and had I not specified a cork stopper, I might have got an expensive bottle with a ground glass stopper.

Silverman soon returned and said that he was quite unable to find any metallic mercury.

I asked him if he had been attempting to get it at a shoe-shop or a beershop.

" No," he replied, " at a wholesale chemist's."

I told him that he must have made a mess of it somehow ; then I sat down and wrote carefully, " Wanted—one pound of metallic mercury in a strong glass bottle with a cork stopper."

It was not long before he again returned and said there was no such stuff as " metallic mercury " known to the chemist's shop, and he had been to a large wholesale place. As the big chemist's shop was not more than two hundred yards distant I went round with him, saw the man behind the counter, to whom he had already applied twice, and said :

" I have sent this young man round twice for some metallic mercury, and he tells me that you say you have nothing of the kind."

" No, we have never had any call for it," he replied.

" But is this not a chemist's shop ? "

" Yes, and one of the largest in London."

" Do you sell all kinds of chemicals ? "

" Yes."

" Then how does it happen then that you have no metallic mercury ? "

" We have never had any call for it before. We do not know what it is."

I then asked, " Have you any bicarbonate of soda ? "

" Yes, tons of it."

" Have you any bicarbonate of potash ? "

" Certainly ; any amount of it."

" What is bicarbonate of potash a bicarbonate of ? "

" Why, naturally, of potash."

" Could you let me have some potash before it is made up into a bicarbonate ? "

" Certainly."

" Have you any bichloride of mercury ? "

" Yes, lots of it."

" What is bichloride of mercury a bichloride of ? "

Here I had him ; I asked him if it were his first day on duty.

" No, I have been here twenty years."

The head man hearing the uproar then came in and said : " You fool, the gentleman wants quicksilver."

Curiously enough, it had never occurred to me to call it by that name, though I certainly ought to have thought of it. However, it is never called quicksilver by scientific men.

At a later date I saw an advertisement in the newspaper : " STRONG MUCILAGE SUITABLE FOR DRAUGHTSMEN." I applied at the large general store and was directed to go to the stationery department. I told the young man behind the counter that I had seen their advertisement and would like to get some of their " strong mucilage." He gave me a very puzzled look and said that they didn't have any.

" But why do you advertise it ? " I said.

He replied that he did not know, for there certainly had never been any call for it.

" I suppose this is your first day here, is it not ? "

" No, I have been here some months."

I saw a party in the distance known as a floor-walker and

applied to him, telling him of the advertisement, and what I wanted. Together we applied at the counter. I assured him that the young man said he had no mucilage, in fact, didn't know what it was. Looking up, the floor-walker pointed to a line of bottles with large red letters, "MUCILAGE," and a sign about three feet long, also with red letters, which read "STRONG MUCILAGE." He called the young man's attention to the bottles and to the sign.

"Oh," he said, "I've always sold that as liquid gum."

It is very strange how the names of things get mixed, and it is quite possible that these two salesmen knew all the time what I wanted, but thinking that I was putting on airs by calling it by a different name from the one they used, they wished to snub me.

But this does not apply to everything. When I got well on with my gun work I wanted some good strong emery cloth. The best in the market is American, and this is made of the very strongest twill cotton cloth, the cleanest and sharpest of emery and the toughest of glue; even then it is not so good as we should like to have it. But the ship bringing it over had gone down, so there was not a particle for sale in London. Again I sent my man Silverman (Friday, as he was called at the time) to Buck's, on Holborn Viaduct, with an order for some of "the best emery-cloth." He brought it back and gave it to the men, but when they tried to use it, it seemed to go into dust. The cloth was very flimsy, the back being covered with glue and whiting, and the working side with something that looked like emery. I examined it under the microscope and found that by far the greater part of the material used was furnace slag. I then sent it back and asked for the "best," but received only the same kind of material. I thought it very curious, so I went down to Buck's myself, taking the emery-

cloth with me. I saw Mr. Buck and told him that I really wanted American cloth, but he said there was none to be obtained. I informed him that the material he had sent me was the worst I had ever seen ; I had never seen anything so bad before.

" But," he replied, " you have got what you ordered ; here is your order ; you ordered ' THE BEST,' and I sent it to you." Then a brilliant idea occurred to Mr. Buck. He ventured to say, " Perhaps you want something better than ' THE BEST ' ? "

I learned that " THE BEST " was the trade name of the very worst and cheapest cloth, which was used for cleaning kitchen knives. He had " something very much better but not quite so good as the American." However, it did very well until the American cloth arrived.

Wishing to make a wheeled carriage for my gun, I ordered from the importers some very strong, but light, American wheels with hickory spokes. Instead of delivering the wheels they asked me to specify the kind of tyres that I wished to have shrunk on to them. I said I would attend to that myself, but they would not deliver the wheels without the tyres. On asking them why, they said that the reputation of American wheels had been greatly injured in England on account of certain parties interested in the carriage trade having furnished the blacksmiths with very fine saws, instructing them to saw off the tenon of some of the spokes, so that they would not enter the rim more than an eighth of an inch, and to do this to at least four spokes in each wheel. This made it appear as though the American hickory was very brittle, and would not stand the English climate.

Again, wishing to purchase some lamp-black, which is the very best thing to use on wooden foundry patterns, I

was only able to get some very coarse and gritty soot, which was the worst stuff I ever saw. I applied at several places and always got the same thing. Finally, I ran across a small paper of real lamp-black. I took it to the paint-shop and told them that was what I wanted. They examined it and said: "That is not lamp-black at all, that is vegetable black"; but when I asked them what sort of a vegetable it was made of they were unable to tell me whether it might be potatoes, cabbage, turnips, or mangel-wurzels.

Later on, I found how this change of names occurred. Lamp-black, as its name indicates, is the kind of black that is given off by a smoky lamp. It may be made from any kind of a smoky flame, such as pitch, tallow, or petroleum. Its name in French is "noir de fumée"; it is the densest pigment known, but of course is not the cheapest. At first the dealers commenced to adulterate this expensive pigment with pulverized charcoal, soot, and nearly everything that was black. Each manufacturer had to produce something very cheap, or he was unable to sell it. The result was that the material called lamp-black was nothing more nor less than a mixture of soot and pulverized charcoal. They therefore had to coin a new name for the real lamp-black.

At first my new American tools were a little too much for the British workman, but there was not a tool in the place that I was not familiar with. I had one of the latest and best brass-finisher's lathes from Boston, but no one seemed to understand it. When, however, I undertook the job myself it was a revelation to them. I ultimately purchased an American pattern-maker's lathe and hired a pattern-maker. As the centres that came with this lathe were the common sort, I made a hollow dead centre, with a

small central spike. I expected that the pattern-maker would know how to use this, but later on, when I asked him how he liked it, he said it would not work at all until he filed it. I then found that he was using it for the driving centre, instead of the dead centre, and that he had filed it into teeth so as to grip the wood.

When tools were required for the various machines I forged them out and tempered them myself. The men thought it was very exceptional for a man in my position, who was a clever draughtsman, to be a blacksmith. One day, having occasion to use a little glass instrument, I sent out, bought some glass tubes, and did the glass-blowing myself. The men had never seen anything like it before. One of them chucked his cap down on the floor, stamped on it, and said: "There's nothing that the old man can't do."

It was necessary to make a series of experiments before I could make a working drawing of the gun, so I first made an apparatus that enabled me to determine the force and character of the recoil, and find out the distance that the barrel ought to be allowed to recoil in order to do the necessary work. All the parts were adjustable, and when I had moved everything about so as to produce the maximum result, I placed six cartridges in the apparatus, pulled the trigger, and they all went off in about half a second. I was delighted. I saw certain success ahead, so I worked day and night on my drawings until they were finished and went into the shop and worked myself until I had made a gun. It was finished in due time, and on trying it with a belt of cartridges I found that it fired rather more than ten a second. Several of these guns were made, and when it was reported in the press that Hiram Maxim, the well-known American electrician in Hatton Garden, had made an

automatic machine gun with a single barrel, using service cartridges, that would load and fire itself by energy derived from the recoil over six hundred rounds in a minute, everyone thought it was too good to be true—a bit of Yankee brag, and so forth; but the little gun was very much in evidence.

The first man to come and see it, other than those interested, was Sir Donald Currie. A day or two later Mr. Matthey, the dealer in precious metals in Hatton Garden, brought H.R.H. the Duke of Cambridge to see the new gun. The old Duke was delighted and congratulated me on what he considered to be a great achievement. This was the signal for everybody in London interested in such matters to visit Hatton Garden, see the inventor, and fire his gun.

I found that I could not obtain reliable cartridges in Birmingham; many of them were faulty, some with only half charges of powder, and some with no powder at all; so I applied to the Government for service cartridges, and these were supplied, I, of course, paying a rather high price for them. After a time, the Government could not understand why I required so many cartridges. I had to explain. Finally, they let me have all that I would pay for, and I used over two hundred thousand rounds in showing the gun to visitors.

CHAPTER XV

AMONG my early visitors was H.R.H. Albert Edward, Prince of Wales, accompanied by H.R.H. the Duke of Edinburgh. This visit was followed by those of many other royalties, dukes, and lords, and so much of my time was taken up showing the gun to visitors that it became necessary for me to work at night and on Sundays.

As I was still receiving a large salary, or perhaps I should say retaining fee, from the United States Electric Lighting Company, I had occasionally to attend to their European business, and while I was in Paris looking after their affairs I received a telegram from London informing me that Lord Wolseley with a large number of the high officials connected with the Government and the War Office were to visit my place the next day at eleven o'clock. I took the night train, arrived in London in due time, had my breakfast, went to the shop, had everything made ready and, promptly at eleven, the gentlemen arrived. They fired some hundreds of cartridges and complimented me highly. Lord Wolseley said: "It is really wonderful." According to his way of putting it, "the Yankees beat all creation; there seems to be no limit to what they are able to do." He expressed it as his opinion that it would not be long before someone would turn out a machine that would manufacture "full-grown men and women." Here I ventured to remonstrate, very much to the amusement of the party, saying I certainly would not undertake the job,

THE FIRST AUTOMATIC GUN

THIS GUN FIRED AT THE RATE OF 666 SHOTS PER MINUTE, BUT ONLY A FEW OF THEM WERE MADE. IT WAS FOLLOWED BY A MUCH SMALLER, CHEAPER AND LIGHTER GUN WHICH HAS BECOME THE STANDARD FOR THE WORLD

because it would be extremely unpopular. "Suppose," I said, "I could make a machine that would turn out young men, college educated and dressed in broadcloth with any sort of religion required, warranted to vote any ticket, and I could do it for sixpence a dozen, there would still be some old fogies so wedded to old ideas that they would continue the old, slow, laborious, expensive and painful process." This story was told in the London clubs the following evening.

Finally my numerous visitors, with a single exception, left. The gentleman who remained wished to have a private talk with me, so we went into my little office, when he said: "I am Sir Andrew Clark, Surveyor-General of Fortifications of the British Empire; I am an Irishman and you are an American, so we ought to be the best of friends."

"Certainly," I said.

He then went on to tell me that they had a very vexatious problem to solve at the War Office, which he thought I being an American might be able to solve.

I rather remonstrated with him, saying that there were a great many things I did not know.

"Nevertheless," he said, "it is my desire that you go down to the War Office to-morrow morning at eleven o'clock, when I will lay the problem before you, and I hope you will be able to give us the solution of the vexed question."

After he had left I wondered what on earth it could be. However, I was on hand sharp on time. Sir Andrew touched his bell, his orderly put in an appearance, and was told to find Captain Clark and bring him into Sir Andrew's office. When the Captain came, and everything was ready, Sir Andrew spoke substantially as follows:

"Mr. Maxim, we suppose you have heard of the German

slow-burning cocoa powder. This is a remarkable powder ; it is slow-burning, and gives high velocities with phenomenally low pressure. At first we imagined that it must be chemically different from ordinary gunpowder, but we found that it was not. The brown colour is due to the imperfect charring of the wood. We have had no trouble in making a powder that has the exact appearance of the German, but our brown powder behaves exactly the same as our black powder ; there is no difference ; it gives high pressures and low velocities. I have had the German powder analysed by some of our best chemists, and they all agree perfectly. It is an easy thing to analyse powder ; this German powder has exactly as much sulphur, charcoal, and nitre as our own ; still, there is a great difference between the two. What is it ? I have submitted it to many of the leading scientific men in London, but so far no one is able to solve the problem. The German manufacturers demand £35,000 for the secret, and we are about to pay this large sum, but as a last resort I thought that perhaps you might succeed where others have failed."

While Sir Andrew was delivering this little speech I was thinking. I knew that the Chinese made a special powder, for setting off a lot of fireworks all at the same time, that was much more violent than anything made in Europe or America, although chemically it was the same. I knew how the Chinese powder was made. The constituent parts were placed in a copper cylinder with copper balls and slightly moistened. The cylinder was then revolved for three or four weeks by a small waterwheel. It was evident that this powder burnt much quicker than European powder, on account of the extreme fineness and intimate mixture of the charcoal, the sulphur, and nitre. The oxygen did not have to go so far to find something to consume as it did with

our powder. In our powder the individual particles might be one-thousandth of an inch in diameter, and in the Chinese powder they might have been reduced to one hundred-thousandth of an inch, while in nitro-glycerine the oxygen and the materials to be consumed were not separated by one-millionth part of an inch, and nitro-glycerine went off with a snap.

When Sir Andrew had finished speaking I said: "Sir Andrew, you have already told me the difference between the two kinds of powder in language which *I* fully understand, and with your permission I will return to this office to-morrow at the same hour and tell it back to you in language that *you* cannot fail to understand."

"Impossible," he said.

There were two hats on the table, and I said: "Suppose I came into this room and you told me that there was an orange under one of those hats; I pick up one of them and there is no orange; I then know definitely that the orange is under the other hat. You have already told me what the powder is not, and to-morrow I will tell you what it is."

He then gave me a block of each kind of powder and a block of black powder, and on my way back to my little place in Hatton Garden I called at an optician's, where I had purchased a very fine microscope, and asked if they had a micrometer to go with my instrument, that is, a thin bit of glass with very fine markings. They had one, but when I asked how many markings to the inch it had there was a conflict of opinion; one man thought there might be ten thousand to the inch and another three thousand. As I remember, I left the place with the idea that there were ten thousand to the inch, but when I arrived at my office I found their boy waiting for me, who told me that, after all, they found there were only three thousand to the inch. On

account of all this uncertainty I thought I had better find out for myself. I did this by placing it alongside of a fine steel scale with one hundred markings to the inch, and found that the markings on the glass were in hundredths of a millimetre, or two thousand five hundred to the inch.

I first polished off the English powder, examined it with the strongest object glass that can be used on an opaque body, and found that the surface presented all one flat tint ; evidently all the chemicals were finely ground, intimately mixed, and compressed into a very hard mass. I then polished off the surface of the German powder, and saw exactly what I had expected. The sulphur and the charcoal were very finely ground and very intimately mixed, but the nitre was granular. The largest crystal that I found was half of one-hundredth of an inch in diameter, and from that size down to invisibility. This powder was evidently slow-burning, because the nitre that contained the oxygen was separated from the combustible material ; therefore it could not go off rapidly. The slight distance that the oxygen had to travel made all the difference in the world.

The next morning, armed with my microscope and the two blocks of powder, I put in an appearance at the War Office at exactly eleven o'clock. Again Captain Clark was called, and I showed the two officers the difference. They were delighted ; the mystery was solved and the money saved.

Sir Andrew asked me how I accounted for it ; why I had succeeded where all the others had failed ?

I told him that it was because they had relied on chemistry and I on the microscope.

A few days later I went down to Sittingbourne, where there was a large powder factory, and made about a hundred different varieties of powder. I first weighed out very

carefully the charcoal and the sulphur. I put these into the mill, damping them to prevent any loss in dust, and when they had been in the mill for about two hours I carefully weighed out the nitre, mixed it intimately with the other chemicals, and started the mill again. At the end of five minutes I took out a specimen of the powder, put it in a pasteboard box and labelled it "FIVE." Every minute after that I took out another specimen, labelling it the number of minutes that the nitre had been in the mill, until I had about fifty specimens. I then continued milling, taking out a specimen every five minutes, and kept this up for some hours. I took the specimens back to London with me, and demonstrated before the officials that powder of any degree of slow burning might be made by that process.

The only remuneration that I got for this work was the assurance on the part of Sir Andrew that certain scientific gentlemen in London would be furious on account of what I had done with my little microscope; "they would never forgive me."

As soon as my gun was proved to be a success the gentlemen who had become interested in it, and they were about the best men in London, organized a little company called "The Maxim Gun Company"; and when it was *un fait accompli* and they had provided a secretary, I told him of some of my experiences in the States—in particular that when the United States Electric Lighting Company was organized, I ordered the stationery; and although I had printed the name of the company in capital letters, still, when the stationery arrived, it read "THE UNITED STATES ELECTRIC *LIGHTNING* COMPANY." The printer, however, admitted that it was his fault and provided new stationery. I charged the secretary to use great care in getting the printing done, and he assured me that there

would be no mistake. However, when we received the first cartload of it, it was "THE MAXIM *GUM* COMPANY." It is ever thus.

Punch's advice to those about to get married was—"DON'T," and my advice to all those who have sufficient means to live on, is DON'T GO INTO BUSINESS.

One of my first guns was exhibited at The Inventions Exhibition at Kensington, where a very large number of rounds were fired in order to show it to visitors. But I was not altogether pleased with this gun; it was too expensive to make. Consequently I designed a completely new movement. The system of handling the cartridges and extracting the empty case from the barrel was totally different from anything ever employed before, and I made one spring do for both the firing pin and the sear.

This little gun worked splendidly; it was a daisy, and was known as "the little white gun," because the case had never been oxidized. It was while this little gun was on exhibition at Hatton Garden that a tall and dignified gentleman called. He was beautifully gloved, and had a gold-rimmed monocle fixed in his eye. He told me, in very stilted language, that he had come to see the gun. He looked at it, took out his watch, expressed his doubts about its being able to fire six hundred rounds in a minute, and said he wanted to see the six hundred rounds go off. I said: "It costs £5 a minute to fire this gun; I will furnish the gun if you will furnish the cartridges." He was very indignant and left suddenly. Later on he said that I had insulted him.

Mr. Pratt, of the well-known firm of Pratt and Whitney, of Hartford, Conn., U.S.A., who was at the time one of the finest mechanicians in the world, and an old friend of mine,

THE VERY MUCH SIMPLIFIED MAXIM GUN—THE STANDARD FOR THE WORLD

came to London ; and when I fired the little gun for him he said : " If anyone had told me that it would be possible to make a gun that would pull a cartridge belt into position, pull a loaded cartridge out of it, move it in front of the barrel, thrust it into the barrel, close the breech in a proper manner, cock the hammer, pull the trigger, fire off the cartridge, extract the empty shell and throw it out of the mechanism, feed a new cartridge into position, and do all these things in the tenth part of a second, I would not have believed it. I would not have believed it if Mr. Whitney had told me—no, I would not have believed it if my wife had told me. But now I have seen it done with my own eyes."

This little gun actually fired at the rate of eleven shots a second out of a single barrel.

About this time I attended a banquet in London where there were very many distinguished personages. H.R.H. the Duke of Cambridge took me by the arm, saying : " Come with me, Maxim, I will introduce you to everyone here who is worth knowing," and he did. There were several members of the Royal family present. It is needless to say that this introduction did me a lot of good. There never was a nicer man on this planet than the old and patriotic Duke of Cambridge.

I also received an invitation from the then Duke of Sutherland to spend a week-end at Trentham, where I met the Duke of Manchester, Sir Reginald Macdonald, Mr. Henry Stanley (later Sir Henry Stanley), the African explorer, and several other distinguished people.

On Sunday Stanley, being afraid that we should have to go to church, suggested that we should go into the woods until it was all over, and while there I asked him why he had not brought Livingstone home with him. He told me

that it was because Livingstone didn't want to come ; he was well satisfied where he was, and was having a thoroughly good time.

The following Monday the Duke took us through the locomotive works at Crewe. Everyone was amazed at the size of the establishment. I think they were able to produce one hundred locomotives in a year. To many this seemed incredible, but at the same time the Baldwin Locomotive Works at Philadelphia were turning out a thousand locomotives a year ; I did not mention this fact.

I have always gone in very strongly for what is known as book learning : so whenever I took up any new thing I read everything I could find on the subject. As I had commenced to make guns I purchased and read gun books, military dictionaries, etc. One day I was told by a bookseller that he could obtain for me the large red book that was supposed to be for the exclusive use of military and naval officers. He obtained the book for me, and the very first article I read was on the large built-up naval guns vulgarly known at the time as Woolwich Infants. The writer of the book discussed in a very learned manner the ultimate strength of these guns. The central tube was made of hard steel, which had a tensile strength of thirty-five tons to the square inch ; the rings and jacket were of wrought iron, with a tensile strength of twenty-two tons to the square inch. He then explained how far the steel would yield before it would give way, the value of which was, of course, the tensile strength multiplied by the coefficient of the yield before fracture. The wrought iron, although being much weaker than the steel, would stretch a great deal more before giving way altogether. He was therefore able to show how much pressure would be required to destroy a gun.

THE LOCK OF THE STANDARD GUN

THE FEEDING APPARATUS DISMANTLED

I saw at once the fallacy of this reasoning; the whole thing had been computed on the hypothesis that the gun was never to be fired but once. I saw that if a charge were used large enough to stretch the steel up to its elastic limit and take the iron along with it, the steel would return to its original shape as soon as the projectile was out of the gun, but that the wrought iron would not follow it; there would be a slight space between the wrought iron and the steel, and this space would increase at each discharge, until the wrought iron would cease to be of any value in supporting the steel; then in all probability the unsupported steel would crack, a little gas would escape and get into the space, expand the wrought iron still more, and after a few rounds the gun would go to pieces.

Sure enough in later years I learned that this had actually taken place, and that it was reasoned out exactly as I had reasoned it out at the time.

It was only too evident to me that a book of this kind would not do me any good, and so I did not read it; but it was a mistake all the same not to do so, as will be seen later on.

The British Admiralty had asked the gunmakers for a special gun for firing on torpedo boats that could be loaded and fired with great rapidity; something between a three- and a six-pounder.

The great firm of Armstrong produced a six-pounder that was very heavy and clumsy: I believe that four men succeeded in firing it at a rate of about ten rounds in a minute. This was followed by a very much lighter and better gun by Hotchkiss, and if I remember rightly four men succeeded in firing seventeen rounds in a minute from this gun. Nordenfeldt produced a very light gun indeed, with an action that permitted it to be loaded with greater

rapidity, and this gun was fired with a crew of four highly trained men at a rate of twenty-five rounds in a minute.

These were not automatic guns, and I did not enter into the competition until after I had finished my work on fully automatic guns. I then made for the Chinese Government a battery of semi-automatic guns, using the same length of cartridges (21 inches), and I also made one that I took over to France. It was in the Chinese specification that the gun should fire forty rounds in a minute, and it did this in England with a crew of two men : but the one I took over to France I fired myself. It was solidly fixed so that it could not move while firing, and was fired for rapidity only. The cartridges were placed near the gun, and I actually loaded and fired forty rounds in fifty seconds.

Later on I made a twelve-pounder with a still longer cartridge, which was completely automatic : and this fired much faster.

Lord Wolseley was one of the cleverest and brightest military men that I have ever met. I sympathized with him deeply because he seemed to be afflicted with a very active imagination ; a trouble that I had suffered from for many years. I often met his lordship, and on one occasion he commenced to discuss the machine gun question. If machine guns were to be used in the service he saw no reason why they should not have a larger cartridge and a longer range than the infantry rifles, and he asked me if I could make a gun having a very long range with a projectile that would penetrate the sides of the caissons at long range.

I told him that such a gun would not be so effective as the smaller gun in stopping the mad rush of savages, because it would not fire so many rounds in a minute, and that there was no necessity to have anything larger than the service cartridge to kill a man.

SEMI-AUTOMATIC SIX AND FOURTEEN POUNDERS FOR FIRING ON TORPEDO BOATS

He then asked me if I could not make a gun with ammunition that would be good at all ranges ; something that would stop the rush as effectually as the smaller gun.

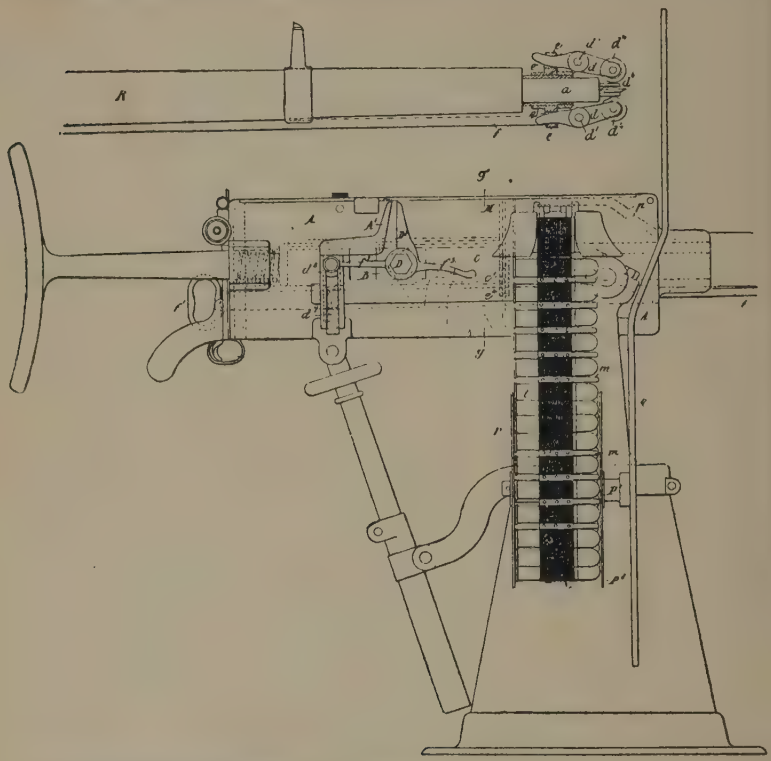
After thinking the matter over for some time I designed a gun, made and patented it. It had a bore of three-quarters of an inch, a large powder charge, and a very peculiar kind of a projectile with a hardened steel core. The projectile was made up of several lead segments arranged around the central steel core, and the whole held together by rings of lead hardened with tin. In firing at long range the projectile acted the same as any other projectile. On striking the steel plate the hardened steel core would easily pass through the sides of the caissons, and in case of a mad rush at very short range it was only necessary to move a handle to bring four cutters into position in front of the muzzle that would cut and weaken the lead rings sufficiently to allow the projectile to fly apart, and to act very much like buckshot out of a large shot gun.[1]

But at very long range a gun cannot be used to advantage unless the gunner is able to see where his projectiles are striking ; and this led to the invention of the Pom-pom, which is nothing more nor less than a large Maxim gun, having an explosive projectile weighing a little over a pound, loaded with black powder and provided with a fuse. With this gun it is possible for the gunner to see the smoke from the bursting projectiles, and thus place them where they will do the greatest damage to the enemy.

I was always a great believer in the efficacy of this gun, but our military adviser, Captain ——, was very much opposed to it. He said that one English field gun would

[1] Many articles appeared in American papers ridiculing this gun, the writer pretending to be a great gunmaker, although he had never made, invented, or patented a gun in his life.

put a whole battery of these guns out of action in five minutes, and he strongly objected to my calling the attention of Governments to this particular arm, as he said it would



LONG-RANGE GUN, DESIGNED AT THE SUGGESTION OF LORD WOLSELEY

Very long range machine gun, for using projectiles having a diameter of $\frac{3}{4}$-inch, with an attachment on the muzzle to give a buck-shot effect at short range.

greatly injure our reputation to do so. I learned afterwards that he never lost an opportunity of ridiculing the gun whenever he met British army officers.

Later on a considerable number of these guns were sold and were supposed to go to Madagascar; I think that they

were intended for Madagascar, but the French arrived there before the guns, and they could not be landed, so they ultimately found a place in South Africa, and during that vexatious war it often happened that one Pom-pom manned by four Boers secreted behind stones and underbrush would put a whole battery of British artillery out of action in a very short time. The cartridges were loaded with smokeless powder, and the Boers never fired more than twelve rounds at a time, for fear that the vapour and the dust might be seen. The English artillerists, although very skilful, were, of course, unable to take sight at a feeble sound, and before they could find out the locality of the Boer guns their own battery would be put out of action.

After this there was a very lively demand for the 37 mm. Maxim gun, euphoniously known by the name given to it by the African niggers—" Pom-pom "—and that demand has continued in spite of the contemptible charlatan in the States who ridiculed the gun and its origin.

CHAPTER XVI

WISHING to have some assistants in France I took over two English mechanics, men who had actually made the gun, all but the barrel. It was arranged that the gun, which was a three-pounder, should be fired on Wednesday, and after installing the men comfortably in a little hotel, I told them to be on hand on Wednesday, when I would take them to the range. That same evening I received a telegram that the time of firing had been changed, and that the gun was to be fired at two o'clock on Tuesday instead of on Wednesday. I tried to find my men all that night up to one o'clock in the morning, but failed to do so. On applying at the hotel about nine o'clock in the morning I found that they had remained out overnight. As it was impossible to find them I had to undertake the job all alone. In handling the heavy parts I got the first finger of my left hand very badly injured ; the French doctor told me I should never have any feeling in the tip of that finger afterwards, and he was quite right. However, I managed to fire the gun without making much use of the wounded hand.

I finished up the job without finding the men, but they managed to get home with their return tickets.

It was necessary to work the patents in France, so I had a gun made by the well-known firm of Bariquand et Fils, 27 Rue Oberkampf, Paris ; but the small gun that I actually submitted for trial was made in my own shop in Hatton

Garden. The man who had charge of the making of this gun was an old man who had been a gunmaker for many years at Birmingham and was wonderfully expert. He knew every trick of the trade.

When Mr. Pratt, of Pratt and Whitney, was in London and we were talking of guns, he informed me that he had never succeeded in making V-springs for a gun that would last more than fifty thousand rounds, and that they generally gave out much before that. He had rigged up a machine by which these springs could be tested without firing the gun. He asked me how many times our springs could be used without breaking?

I told him that we never had had a broken spring, and I showed him the secret of making these springs, which I had learned from my old gunmaker.

Pratt followed my instructions, made the spring when he went home, compressed it, and it went a million times without breaking.

I entrusted my gunmaker with the job because I wanted the very best man that could be found. I knew that the tests would be very severe and wished to be prepared for them.[1] I was unable, however, to get any genuine French cartridges; they would not allow one to go out of their country. At that time, the Gras black powder cartridge was being used. I had the dimensions of the cartridge and the specifications as regards the bore of the rifle, but the actual parts that seize the cartridge, pull it from the belt, thrust it into the barrel, extract the empty case and expel it from the arm, were not quite finished, and so I wished to take my man with me to France to finish the job after we had the real cartridges. Before doing so I had a plain talk with him. I told him of the trouble that I had had with the other

[1] This was a small rifle calibre gun.

men : how they had got drunk and were of no use. I told him I should take him to Paris first-class, take him to the Continental Hotel at first, and then find a little place for him near the workshop. I told him that he must keep sober until the work was finished, and then he could get drunk and keep drunk if he liked.

He assured me over and over again in the strongest language that he would not touch a drop of anything intoxicating until after he had returned to England.

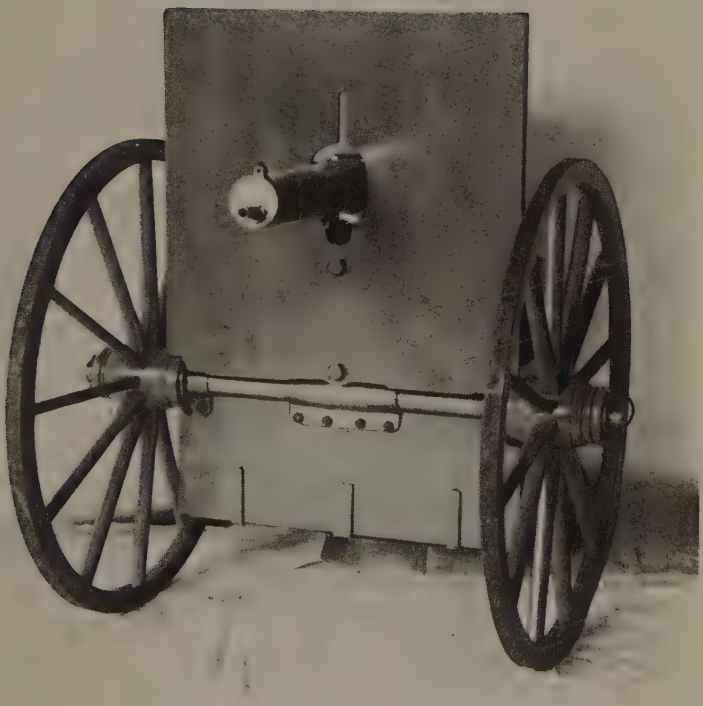
We arrived in Paris on Sunday. The next day I found him a comfortable boarding place and introduced him into Bariquand's shop. The day following, accompanied by one of our directors and the gunmaker, I took the gun to Versailles. We learned that it would not handle the French cartridges without some alteration, as we had expected. We were given a few empty cartridge cases and, taking the lock from the gun, went back to Paris.

At the railway station I engaged a cab, intending to go to the workshop, but my fellow director said : " You are wearing yourself out ; you work too hard, you will not trust anybody except yourself. —— is a first-class man and will be sure to do the job properly."

I therefore paid the cab in advance, *pourboire* and all, told him exactly where to leave the man, and went back to the Hôtel Continental with my fellow director.

He was to have all day Wednesday to work on the gun, and it was to be fired on Thursday. We had some business with officials in Paris in the forenoon of Wednesday, but in the afternoon, in spite of the protests of my fellow director, I took a cab for the workshop.

On arriving there and going to the part of the shop set aside for the work I asked : " Where is the tall Englishman ? " (they already called him " le grand Anglais ").



THE BUSINESS END OF THE MAXIM GUN SHOWING THE BULLET-PROOF SHIELD

The reply was, "Pas encore arrivé."

As I discovered that he still had the parts of the gun with him, I went to his boarding place and asked again "*Où est* le grand Anglais?" The woman said she didn't know but she thought that I might find him at "the house of a merchant of wines" farther up the street. On being questioned, the woman went on to tell me what had happened the night before when he had returned from Versailles. He didn't speak a word of French nor she a word of English. She had given him a small bottle of claret, and no sooner had he drunk it than he motioned for her to bring another, and after that, still another. This continued until he had managed to get outside of eight half bottles of wine. One of the women bystanders raised her hands and eyes heavenward and said, "Mon Dieu, huit bouteilles à la fois!"

This information being of no service to me I went in search of the old man in the various drinking places in the vicinity, and at last had the good luck to find him. He was stretched out on a seat apparently dead drunk. I do not know what the people must have thought, but I at once searched his pockets, found the missing lock and cartridge cases, and left. By going at it myself, I succeeded in altering the parts so that they fitted the cartridge.

The next day, in company with my fellow director, I was at Versailles promptly on time and had a first-class test of the new arm; everything went very well indeed.

The day following I returned to Bariquand's and found that the gunmaker had not been heard of. I left word that when he did return, they were to take him to the Gare St. Lazare, and pay his third-class passage to London, but not to give him a penny in money.

He arrived in London on Sunday morning and had to

walk home to Enfield. He was in a dreadful condition when he reached home, and it was a fortnight before he could resume work in the shop.

The French officials asked me if I could not produce a gun in which the rate of fire could be regulated. Their idea was that if a gun could be made so that it would fire at the rate of about one shot per minute it might be secured in position so as to cover a breach in a fort or earthworks and prevent the enemy from making repairs during the night. I accordingly made a gun and took it over to Versailles ; and after firing a few rounds at all degrees of rapidity from 650 to 1 per minute, I adjusted the regulator so as to fire just one shot per minute and left the gun by itself. While we were waiting a young lieutenant came on the ground and asked if we were going to fire the gun, as he would like to see it. He was told that the gun was firing, but he didn't believe it ; however, in a few seconds the gun went off by itself. He then waited with his watch in his hand, and in just one minute the gun went off again. He threw the remains of his cigarette on to the ground, kissed his hand, and threw the kiss at the gun.

Lord Wolseley, from the very first, took a great interest in the gun and suggested that I should take one to Pirbright and fire it in his presence. I took one of the best guns that I had made up to that time, with a lot of empty belts, allowing his Lordship to furnish the cartridges. When I arrived on the ground with my gun I found that the target was of cast-iron, somewhat like an immense gong. It had a bull's-eye, painted after the conventional manner and the range was six hundred yards.

The gun was mounted on a tripod, one member of which extended a long distance to the rearward and formed a support for the seat. I shook the gun about, stamped on

the feet of the tripod and worked them down into solid earth, and then took a few trial shots in order to adjust the sight. When everything was ready his Lordship came on the field. I put in a belt of 333 cartridges, pulled the trigger, and they went off in exactly half a minute. Then something altogether unexpected occurred, which for a time greatly puzzled everybody except myself. The big cast-iron target had been acting as a gong, and when I ceased firing the noise on the gong continued. We heard many bullets strike the gong after the last one had left the gun. I saw the point at once and explained it. When we stopped firing there was a considerable number of bullets in the air between the gun and the target, and a corresponding number of reports coming back from the target. His Lordship thought this very curious and interesting. He examined my tripod mount, and putting his foot on the long member extending to the rearward, said: "That is the secret of the accuracy of fire." The gun did not budge while firing, and it made the best target ever made by a machine gun at Pirbright.

I had considerable confidence in my gun, and when I received an invitation to fire at Enfield I was delighted. In the meantime the Government sent me an order for a gun. They specified that it should not weigh over one hundred pounds, should fire four hundred rounds in one minute, and six hundred rounds in two minutes. I had already hired a clever Scotch mechanician as foreman; he was full of zeal and naturally wished to make a success of the trials. I took a gun to Enfield, with my Scotch mechanician as an assistant, and much to the surprise of all and to my own utter disgust, the gun jammed every time before twenty shots had gone off. Not only that, but the feeding gear broke. I took the gun back to my workshop and increased

the strength of the feeding gear very much, tried it again at Enfield, and it again jammed every time before twenty rounds had been fired; and this notwithstanding that it fired hundreds of rounds without the least hitch in London. On examining the gun several times after it had jammed, I found two cartridges wedged into the firing position at the same time; I noticed also that the cases were much deformed. I was greatly puzzled. I again took the gun back to London, and as was my habit I studied the subject after I had gone to bed at night, but no solution came. The next morning I said to myself, "Certainly a thing like this is susceptible of solution; I ought to find it out." It then occurred to me that there was only one way to get two cartridges into the feed box at the same time, which was by two separate means of forcing them in. The gun put in one cartridge; some other agency must have put in the other. I put a short belt of cartridges into the gun and set it firing. I pulled on the empty belt with my hand, and, sure enough, the same thing happened—two cartridges were jammed together and both distorted; my assistant in his overpowering zeal had pulled the belt while I was firing. I reduced my feeding gear back to its original dimensions, and took two guns back to Enfield. I placed one of the ordinary type on a tripod, put in a belt of cartridges and fired 666 rounds in one minute of time, and as the gun only weighed sixty pounds it was accepted.

In the meantime I had provided myself with a very long box, and a belt with three thousand pockets for cartridges. I had a very light gun, weighing forty pounds, and this I placed on a naval cone such as is used for machine guns on battleships, but the cone was partly filled with water, with compressed air on top of the water. On pulling the trigger a little valve was opened, when the water entered the water

jacket and thereby ensured keeping the gun cool. I introduced the belt, and had a man whose duty it was to push the belt forward to the gun, so that it would not have to draw the belt too far. I pulled the trigger and the cartridges commenced to go off at the rate of about 670 a minute. Many of the bystanders had to retire before the belt was finished on account of the dreadful fatigue to the ears. Both guns were accepted and paid for by the Government, and this was the commencement of my success as a gun-maker.

Shortly after I had supplied the British Naval Department with a fully automatic three-pounder with cartridges 21 inches long, and had fired it at Whale Island, Portsmouth, and also at Shoeburyness, I received a call from Lieutenant Marion, who I believe is an admiral at the present time. He told me that he did not know whether there was anything in the automatic system or not; some people approved of it and others did not. "But," he said, "whether you have a good thing in the automatic gun or not, one thing is very certain. Your system of mounting the gun is altogether the best of anything in existence—have you got a patent on it?"

I found I had only patented the mounting in connection with an automatic gun. He said he knew that the mounting was so much better than any other that it would go into use everywhere: and he was quite right. Had I made myself familiar with the red book previously referred to I should have known that my mounting was new; but I naturally imagined that so simple a system could not possibly be new, so I made no special claim on it. However, later on I received the personal Grand Prix in Artillery at the Paris Exhibition.

Not long after this I learned that there had been a trial of machine guns in Switzerland, the competitors being

the Gatling, the Gardner, and the Nordenfeldt. The two-barrelled Gardner had beaten the field, and large orders were expected. I wrote to the authorities telling them what my gun had done and asking them if they would allow me to fire it in Switzerland in competition with the Gardner. On this occasion I was accompanied by Mr. Albert Vickers, who was deeply interested in the business. Our gun had been made to use a certain German-made cartridge that was not quite so large and powerful as the English, and when we came to test it against the Gardner we found that the Gardner gun was using cartridges of a new type with much smaller bore and longer range. I told Mr. Vickers that unless we were very sharp they would probably beat us at the twelve hundred metre range, which was a very long one for the kind of cartridge we were using. The next morning we were up early ; I managed to purchase some tallow and beeswax, mixed the two in the proper proportions, and after putting the cartridges into the belt, dipped the projectiles in the hot wax. This would prevent the leading of the barrel and increase the range. We then took the gun on to the range to adjust the sights. The Swiss officers assisted us. We fired at various ranges and marked the sights correctly. Everything being ready, we took our places beside a big and heavy Gardner gun, which, with its mount, weighed fully four times as much as our gun and mount. The Gardner was fired first. A sandbag was placed under each of the three legs of its tripod ; a common kitchen table was used on which the cartridges were placed, and then, with one man to sight the gun, another to turn the crank, and two to place the cartridges in the hopper, they ground away at the crank and succeeded in firing 333 rounds in a little over a minute, their gun having two barrels.

We were then asked to fire at another target at the same range (two hundred metres). We did so, and our 333 cartridges all went off in half a minute. On examining the targets it was found that the projectiles from the Gardner gun had scattered all over their target, while we had shot out a big hole in the centre of ours.

The next range was five hundred metres, the Gardner having the first chance. On this occasion the man turned the handle a little too fast, the cartridges failed to fall in quick enough, the gun jammed, and on removing the hopper a large number of cartridges fell out into the sand. We had to wait until these were wiped and put back on to the kitchen table, when the firing was resumed ; the whole occupying about three minutes. We then fired another belt of cartridges in the same time as before and made an excellent target. After this the Gardner was not fired at all.

We were then asked to fire at one thousand metres ; we did so, and they expressed themselves as satisfied. The target was so far away that we could not examine it, but we received a telephone message saying that it was highly satisfactory.

Now came the crucial test of the day. The officer in command requested us to fire at a dummy battery of artillery at a distance of twelve hundred metres. The sights on the gun had only been marked up to one thousand metres. The sun was shining very brightly and the cold air was coming down from the snowclad Jungfrau at the same time. At first I was quite unable to see the battery of artillery. The officer informed me that it was the blue streak that I could see in the distance. When I sat down on the tripod and tried to sight the gun the refraction caused by the mixed currents of hot and cold air made it

extremely difficult; sometimes the target would be too high and again too low; sometimes it would appear to rise up in the air and then drop down again; then half of it would go up while the rest of it remained down. Mr. Vickers being a very good shot, I asked him to sit down behind the gun and see if he could sight it; but the glimmer was too much for him. I therefore set the sight about where I thought it ought to be for twelve hundred metres, and marked it. I moved it a little higher and told Mr. Vickers that if we fired off the whole 333 rounds at once we might not hit the target at all; they might fall short or they might pass over the top. The officers wished to see how many hits we could make in one minute of time. The gun-mounting was provided with two stops to limit the travel from right to left, so I adjusted these so that the gun just covered the length of the target, which might have been two or three hundred feet, and having put a belt of 333 cartridges in position, I sighted the gun for what I thought would be a little too high, and fired about one hundred rounds, sweeping the gun slowly round from left to right. I then changed the sight to the point that I had marked, and this time I fired rather more than one hundred shots, swinging the gun round as I fired; again I changed the sights to what I thought would be a little too low and fired the remainder, swinging the gun round as I fired. All was done in slightly less than one minute of time. After waiting about twenty minutes, the telephone rang and we were informed that we had technically killed three-quarters of the men and horses. I asked Mr. Vickers if he supposed they expected us to kill the whole of them; he said he didn't know, but shortly we were approached by the officer in charge, who informed us that we had done very well. He said enthusiastically: "No gun has ever been made in

the world that could kill so many men and horses in so short a time," and they gave us an order.

Several years later, when Lady Maxim and myself were travelling in Switzerland, we managed to find ourselves in a little pocket among the Alps, with high, snow-covered mountains all about us. A short distance away we saw a shop with a large number of postcards displayed in the window, and having finished our lunch, we proceeded to make purchases. We were much surprised to find that on nearly every one of them there was a picture of someone firing the Maxim gun. There was a wooden Maxim gun in the little village, and it was considered the thing for visitors to be photographed seated on the gun, with the mountains in the distance. If the mountains were covered with clouds, an excellent imitation painted on a large screen was used which did just as well, perhaps better.

Before leaving London for the Swiss trials we had heard that there had been a trial of machine guns for the Italian Navy at Spezzia, and that the Nordenfeldt gun had been adjudged the best for the purpose, so we had requested the Italian authorities to allow us to compete with this gun. Mr. Vickers and myself accordingly took our gun from Switzerland with a sufficient number of cartridges and went to Spezzia. As the Nordenfeldt gun had already been thoroughly tested they knew exactly what it would do, so that we only had to beat the record made by that gun, which was a very simple matter. Our gun was lighter, fired much faster and with greater accuracy, and did not require so many men to work it. We were requested to throw the gun into the sea and allow it to remain there for three days ; we did so, and at the end of three days, without any cleaning, the gun did just as well as it did when it was dry. We then returned to London, leaving our gun at Spezzia.

After some weeks, when they had received a fresh supply of cartridges, the old ones being bad at that time, H.R.H. the Duke of Genoa, Admiral of the Fleet, wished to see the new gun fired. As I was extremely busy at the time on other jobs, I was quite unable to go to Spezzia myself, but in the meantime we had obtained an agent in the person of Nicholas de Kabath, the Russian Consul at Spezzia, and he came to London to see me in order to become interested in the gun. We were old friends, as we had met in New York and also in Paris. De Kabath was most anxious to assist us. The day was fixed when the Duke of Genoa would be at Spezzia to see the gun, and he wished to have it fired from a battleship while both the battleship and the target were in motion.

I detailed two men to go to Spezzia with De Kabath. One was an extremely good gunner, with a splendid record in the British Navy, while the other was one of my best mechanicians, a man who could make the gun from beginning to end—everything except the barrel. I knew that these two men would do perfectly well, and it was quite possible that the experienced English gunner would be able to do better than myself on board a ship.

Before they left London, I told De Kabath something about English workmen. I informed him that when they were absent from the shop, it was to them an outing, and no outing was possible without a liberal supply of drink; that the only way he could manage them would be to see to it that they did not have any money in their possession on leaving England; that he should take complete charge of them, paying all of their bills himself, and should be sure not to allow them to have any money until the trials were over; also that he should take them to the same

hotel where he was to stop himself, in order to have them constantly under his eye.

Everything went well until they arrived in Spezzia, when the men had many excuses why they should have a bit of money; but he remembered my words and was obdurate. Finally, the night before the trial, at eleven o'clock, they rapped at his door, saying their washing had come home and they wanted to pay for it. He gave them ten francs each, and the next morning they did not put in an appearance on the ship. On searching for them, he found both of them helplessly drunk. Finally, the firing had to be postponed and the Duke had to remain over another day, when everything went off very well, and we received a large order from the Italian Government.

Shortly after, we learned that they were having a trial of machine guns at Vienna, and that the Nordenfeldt gun so far had beaten the field. I wrote a very strong letter to the authorities, giving them the weight of my gun, and impressing upon them that it required no one to work a lever or turn a crank. I pointed out that considerable force was needed to work the lever on the Nordenfeldt gun; that in the field, on soft ground or grass, the gun had a strong tendency to participate in the movement of the lever or handle, and therefore accuracy of fire was impossible. I asked to be allowed to take a gun to Austria and fire it. A few days later I received permission to do so, and at once took a gun to the armoury in Vienna, and fired a few hundred rounds. All the officers expressed their amazement that a little gun should fire so fast and that the crank handle should work without anyone touching it; so it was arranged that a few days later we should take it to the Steinfeld and fire it at long range.

Among the officials who came out from Vienna was

H.R.H. the Archduke William, who was a field-marshal in the Austrian Service. He greeted me warmly and looked with great curiosity at the gun. I showed him the mechanism and explained it to him. I was then asked to fire at various ranges.

The day was very hot, so also was the sand under our feet. When I had fired at a target at about six hundred metres I ran down to the target myself to see what hits I had made and then ran back, very much to the astonishment of everybody. I was used to hot weather in America, and it seemed to have no effect upon me in Austria. A blonde German who was with me on that day shed the skin a few days later on his neck, face, and hands.

We kept on firing all the afternoon at various ranges and at various angles, and when I had made an exceptionally good target at one thousand metres His Royal Highness approached and congratulated me. I asked if it had fired fast enough to suit him.

His answer was: "Ah, indeed, only too fast: it is the most dreadful instrument that I have ever seen or imagined. And now," said His Royal Highness, "I wish to tell you a little of my experience. Yesterday afternoon the agent of the other gun called at my office. He told me that the weather was very hot and advised me very strongly not to go thirty miles into the country and expose myself on the hot Steinfeld for nothing. He said: 'the Maxim gun never works and you will be greatly disappointed.' Now I come out here and see it fired without the least hitch, throwing every other gun completely into the shade—so you see how much we can believe of what we hear."

All the officers were well pleased with the gun, but they wanted one using their own cartridges, which I agreed to make. Unfortunately, however, it was against the regula-

tions to allow one of their Service cartridges to go out of the country; but they gave me an empty case that never had been fired, and a correct drawing with all the dimensions given. On my return to England I ordered a lot of cartridges according to the specification, but it appeared that the people in Birmingham did not exactly understand French weights and measures: the shape and size were all right, but the powder charge was considerably lighter than in the Service cartridge.

I made the gun and fired it. All the springs had to be very light in order to work with so weak a cartridge, but still I made it go.

I had been working very hard and was very tired. I crossed the Channel at night in very rough weather, and finally arrived in Vienna. When I took the gun to the Arsenal and tried it with real Austrian cartridges I was surprised at the rapidity with which it worked. I saw that their cartridges were much more vigorous than those made for me in Birmingham, so I adjusted the springs to fit them, but when I had fired a few hundred rounds, the gun worked very irregularly and finally stopped. On examining it I found that one of the side plates that carry the mechanism had apparently been elongated by the force of the explosion, the right-hand side plate being considerably longer than the left. I took the gun apart and found, very much to my surprise and disgust, that the greater part of the dovetail that secured the side plate to the barrel had been milled off and a loose piece riveted on, the whole being blackened over to deceive me. Had the English cartridges been made to specification this would have been discovered in England, but there was nothing for it. I had to take my gun back to England with me as baggage and make a new side plate.

I was angry and tired when I arrived in London. As this

vexatious trick was the fault of my English foreman, it occurred to me that it would be a splendid thing if I could get an experienced New England mechanic to take charge in my absence.[1]

On my taking the gun into the shop the foreman admitted that he had riveted this piece on, hoping that it would be strong enough, and he regretted exceedingly the trouble he had put me to. He said the weather was so warm and drowsy that the man at the milling machine, after setting the machine going, had gone to sleep in his chair. When he woke up, the milling cutter had passed through the dovetail, and he had riveted a piece on. This little ten-minute nap of my sleepy workman was the cause of one of the greatest misfortunes of my life; in fact, it was the greatest trouble I ever had, as it brought into my life an individual who caused me an immense amount of vexation and trouble, and the loss of many thousands of pounds in money. However, the man that I ultimately employed was all right; the trouble was caused by the man who accompanied him to England.

From America I obtained an extremely clever man from the well-known Winchester Rifle Works. He was a master of everything relating to gun-making, but he would not remain in England.

When I supplied the new side plate to the Austrian gun and fired it with increased charges of powder, it worked splendidly and at a terrific rate. Again I crossed that dreadful Channel and went to Vienna. The gun was again tried at the Arsenal, and the agent of the other gun was on hand like a sore finger;—not on the grounds, however, but looking through the gate with a lot of newspaper reporters. When we came to try the gun with the real

[1] On this occasion I jumped out of the frying-pan into the fire.

Austrian cartridge, everyone was amazed at the pace, and it was on this occasion that I cut out the letters F. J. on a new target at short range. Many high officials came to see the gun, including the Emperor himself, and everyone was delighted.

When the trials were over the agent of the other gun sought an interview with the leading officers. He spoke all languages and was a very plausible talker. One of the officers reported the conversation to me in English in about these words :

" Do you know who Maxim is ? I will tell you. He is a Yankee, and probably the cleverest mechanician on earth to-day. By trade he is a philosophical instrument-maker. He is the only man in the world that can make one of these guns and make it work ; everything has to be of the utmost accuracy—one-hundredth part of a millimetre here or there and it will not work—all the springs have to be of an exact tension. Suppose now, that you want a quantity of these guns, where are you going to get them, as there is only one man in the world that can make them ? Maxim goes into the shop and actually makes these guns with his own hands, and, of course, the supply is limited. Then again, if even you could get them, do you expect that you could get an army of Boston philosophical instrument-makers to work them ? "

At the time that these last tests were taking place, the newspaper men looking through the gate asked this agent what gun was being tested, and he said : " The Nordenfeldt ; it has beaten all others," and this was printed in the Vienna papers, quoted in others, and circulated all over the world.

On the next occasion of my going to Vienna I purchased a comic paper in the street The illustration on the front

page was a representation of myself firing a gun that was made in the shape of a coffin, marking out F. J. on the target with Death standing at my back and holding a crown over my head.

Ultimately I got an order for one hundred and sixty guns for Austria, but I had to work for it, as will be seen from the foregoing.

When the officers at Vienna were satisfied with the working of the gun and had given me a large order, I was asked to meet some of the highest officials, who would tell me what they would like to have me do. They wanted a field gun of a certain size and weight of projectile with a very long range ; and they wanted the gun so mounted on a carriage that the carriage itself would not run back on firing and have to be brought up again into position before firing the next round. In a word, they wanted a gun that a man could sit down on and fire any number of rounds without the carriage running back, the same as could be done with a small Maxim gun. After thinking the matter over for a few moments I saw that it could be done. I knew enough of dynamics and mathematics to know that if a gun were allowed to recoil on the carriage, instead of the carriage recoiling on the ground, the energy of recoil could be absorbed by an hydraulic buffer instead of tearing up the earth ; therefore, that the gun they desired could be produced. The trail would be provided with a spade-like projection that could be driven into the ground at the first discharge ; and after that the sighting or adjustments could be done by screws or apparatus interposed between the carriage and the gun.

I at once went back to my hotel and sketched out the gun freehand on a piece of paper, and sent it to our office in London, asking that a clever draughtsman should be

put on the job to make a drawing of the gun and its mounting without delay.

When I returned nothing had been done, and my plan met with nothing but ridicule from Captain ——, the Company's military adviser. This wise officer told my fellow directors that no Government would accept a gun that weighed an ounce more than existing guns; that my hydraulic buffer, springs, and carriage would weigh more than existing simple types; that the gun would require at least two more horses to draw it; that guns were not as a rule made for actual warfare, but for show, and that the gun I had designed was extremely ugly as compared with the graceful form of existing guns. Nothing was done for years, when finally practically every civilized nation commenced to use a gun on the exact lines that I had laid down. They all had the spade, the long recoil on the carriage, the long hydraulic buffer to absorb the recoil, the powerful spiral spring to return the gun to the firing position, and the same seat for the gunner; but Captain ——'s advice had prevented us from taking a patent, so that what might have been very profitable to our Company, was lost.

The success of the Maxim gun at Vienna was followed by a request from the Austrian Naval Department that we should submit a gun for trial at Fiume, on the Hungarian side of the Adriatic, and we made another gun with a mounting especially adapted for naval use.

To the ordinary workman, English and American, oil is oil; he does not recognize that there is more than one kind of oil in the world. He knows, however, that there are many kinds of alcoholic drinks, and some of them even know that there are many kinds of religion, but at oil they draw the line; they can recognize the existence of but one kind. I had been much annoyed by having lubricating oil

mixed with paint, and linseed oil used on the machinery. The very best oil in the world for guns, clocks, and watches is what is known as " Porpoise Oil." It is expensive, never gets gummy, has a natural affinity for metals, and spreads over their surface. As it only requires a small quantity of this oil to prevent steel from rusting I purchased " Porpoise Oil " to use on our guns, and I had pasted up in several places about the works a short and concise treatise on oils.

When the gun was ready for Fiume, it was carefully and thoroughly oiled, boxed, and sent on, and as soon as it arrived, they telegraphed to us at Crayford, and I started on my journey. I went to Paris in the day, took the night train for Vienna, arrived there twenty-five hours later, went to the Grand Hotel for a night's rest, and the next morning took the train for Fiume. At about ten o'clock at night the train stopped somewhere in the Austrian Alps, and I was told that it went no further that night. I inquired of the man at the station at what time the train would go on in the morning ; and as he didn't understand what I was saying, I repeated the inquiry in French. This time he understood, and straightening himself up and preparing for a great effort he managed to give me the desired information in the following words : " A quartro heures et quarante chinq minuten du matin." I write it as he pronounced it. He had managed to use three different languages ; it seems a pity that he could not have mixed in at least one English word.

On arriving in Fiume early in the morning I at once went to the Arsenal and had the gun taken out of the box The hour for firing had already been fixed at two o'clock in the afternoon. Imagine my disgust when I found that the gun had been liberally oiled with boiled linseed oil, of the quick-drying variety ; that is, it had been literally varnished

and the varnish had dried on. It was necessary for me to dismantle the gun completely, separate the pieces, and scrape each one with my pocket knife. However, by keeping at the job I succeeded in cleaning it up, assembling the parts, reoiling, and then, after a rapid lunch, I was ready for the trials.

After a short trial to observe the rapidity of fire, I was asked to fire at a target about six hundred metres distant. I did so, and then the gun was turned over to their best shot at the same range. He did very well, but I had beaten him, and the job was finished.

The second time that I had to go to Fiume I thought I could shorten the journey by going by way of Italy. Leaving Paris early in the morning, I arrived at Turin about nine o'clock at night. As very few people travel first-class in Italy, I had a compartment all to myself; and as there were no sleeping cars on the line I gave the attendant ten francs to keep other passengers out of my compartment so that I could lie down and have a rest. Everything went all right until we arrived at Milan, when the attendant left, and another took his place. Three passengers entered, two of them English and one a German who spoke English. The Englishmen had two dogs and a lot of baggage, firearms, etc., and when they had put the dogs and some of the luggage in the retiring room, and filled the racks and seats, the compartment was pretty well occupied. It was summer, but the cold air is always coming down from the snowclad mountains at night, so that it was very chilly, and no sooner had the train started than the whole batch of my fellow-passengers commenced to smoke. I called their attention to the fact that it was not a smoking compartment, and they had no right to smoke, but they refused to stop. I then pointed out that there was a fine for smoking in any carriage

except those set apart for the purpose, but they said it was the habit in Italy to smoke anywhere. I was sitting by the window on the side next to the mountains and let it down ; and as the air was, of course, very cold, they demanded that the window should be closed, which I refused to do. Then one of them got up and closed it himself, but no sooner had he taken his seat than I opened it again. He looked at the other one and winked, walked up to the window and deliberately closed it. My idea was to smash the glass so that they could not close the window, and with that object in view I took up a soda-water bottle by the neck, got up and said, " Gentlemen, I am an American. God has made me on a plan that renders me eminently well qualified to take my own part. I cannot be imposed upon, and I wish you distinctly to understand this."

I saw at once that they were afraid of me, so I opened the window, whereupon they stopped smoking, and when the smoke had cleared away I closed it.

By their conversation I learned that these two Englishmen were travelling for their health. I weighed nearly as much as both of them. They were going through to Rome, but on parting from them near Venice I said : " Gentlemen, you are travelling for your health, but if you would employ me to travel with you with my little soda-water bottle I could do more to restore your health than all the doctors in the world."

Of course, the Germans had become interested in my gun, and having obtained the services of a fine German officer who had been wounded by falling from his horse we gave him charge of the job. He brought us some of the real German cartridges, which were then known as Mauser cartridges. As they were short and vigorous we had not the least trouble in making a gun that would fire them with

amazing rapidity. But when the officer in charge of our work took the gun to Germany to be fired, he had only fired a few rounds when the gun ceased to work. With a great deal of trouble and considerable injury to the brasswork, he managed to get the barrel out of the water jacket, when he found it was bulged and looked something like a snake that had swallowed a toad. He brought the barrel back to England and we made one of very strong steel, much harder than is generally used and rather difficult to make. He took this back and before one hundred rounds had been fired the gun stopped again, the barrel was bulged; and a third barrel did the same thing.

About this time, we amalgamated with the Nordenfeldt Company, and I consulted Nordenfeldt on the subject. I told him that I was of the opinion that the cartridges were improperly loaded. It appeared to me that there was only one way that this could happen, which was by a cartridge having had only a few grains of powder in it, just sufficient to force the projectile up the barrel about sixteen inches, and then when the next fully loaded cartridge was fired, the two projectiles in striking each other produced a pressure which stretched the barrel. But Nordenfeldt said that Germany, of all the countries in the world, was the most particular about her ammunition, and it could not possibly have happened in that way. I made another barrel, exactly like the others, and questioned our agent about the kind of cartridge used. From him I learned that the cartridges for machine-gun trials were those that had been fired and reloaded by hand by the soldiers themselves, and that the resizing, scouring, cleaning the cases and loading was a kind of punishment for the soldiers for minor offences. The mystery was solved, and there was no further trouble in Germany.

Although we had got a gun to work perfectly in Germany, matters hung on for a long time, thousands of rounds being fired, but no orders received; "large bodies move slow." When things were in this state, H.R.H. Albert Edward, Prince of Wales, visited the Kaiser, and when the conversation turned on arms the Prince asked the Kaiser if he had seen the Maxim gun. He said he had not, but that he had heard a lot about it. The Prince told him that it was really a wonderful gun, and that it loaded and fired itself over six hundred times a minute out of a single barrel. As the gun was at Spandau, only a short distance from Berlin, the Prince suggested that they should go out and see it. A day or two later, when everything was ready, the Kaiser and the Prince visited Spandau, where elaborate preparations had been made to show all forms of machine guns. Three hundred and thirty-three rounds were to be fired from each gun at a large target at a range of two hundred metres. The old Gatling gun was worked by four men, and got through with the cartridges in a little less than a minute. The same number of men fired the same number of rounds in the Gardner gun in a little over a minute. The Nordenfeldt was also fired and did just about the same. Then one man advanced, took his seat on the trail of the Maxim gun, touched a button and 333 cartridges went off in less than half a minute. They examined the targets and found that the hand-worked guns had made bad targets because the guns themselves had participated in the action of the lever or the crank. All the projectiles from the Maxim gun were in the bull's-eye and the whole centre of it had been shot away.

The Emperor walked back, examined the gun, and, placing his finger on it, said: "That is the gun—there is no other"; since which time vast numbers of Maxim guns have been acquired by the German Military and Naval Services.

THE LATE KING EDWARD, WHEN PRINCE OF WALES, FIRES THE MAXIM GUN

CHAPTER XVII

LATER on, when I was called upon to show a gun in St. Petersburg, I made one using well-made English cartridges, on which I could rely, and on the day of firing a large number of officers in uniform assembled. It appeared to me that they were impatient, and looked with contempt upon the little gun. One young officer went up to it, took hold of the crank, turned it backward and forward, and, speaking in French, said: "It is absolutely ridiculous for anyone to pretend that this gun can be fired six hundred rounds in a minute. No man living can turn this crank-handle backward and forward more than two hundred times in a minute," and he made an offer to bet any amount that the gun could not be fired even two hundred times in a minute.

But it was not long before a belt of cartridges was in the gun, I sat down on the seat, sighted the gun on the bull's-eye, pulled the trigger, and 333 cartridges went off in exactly half a minute. The handle that the officer was talking about worked so fast by itself that it was impossible to see it plainly. I think that nearly everyone was astonished. They didn't seem to have the least conception of what an automatic gun was. A gun was said to be automatic when one turned the handle, and in many of the newspapers it was described as "a gun that would load and fire itself simply by turning a crank-handle." When these Russians saw the handle working all by itself and that the

centre of the bull's-eye had been shot away, they became enthusiastic.

But things move slowly in Russia; I had not been in St. Petersburg more than two weeks when I was informed that I could not be permitted to stay any longer unless I went to police head-quarters to give some account of myself. My old friend, Mr. de Kabath, went with me. The official spoke English perfectly well, and commenced by asking me how old I was, and where I was born. I told him I was born in Sangerville, Piscataquis County, State of Maine, the most easterly of all the States of America. The conversation that ensued was about as follows:

"Are you a Jew?"

"No."

"What religion have you?"

"None whatever—never had any."

"That's what all the Jews say, and foreign Jews are not allowed to remain in Russia. What was your father's full name?"

"Isaac Maxim."

"Ah! Isaac is a Jew name, and so is Hiram. What was your grandfather's name?"

"Samuel Maxim."

"That is another Jew name."

"Not at all. It would perhaps be Jew if it were Maxim Samuel. My ancestors were Puritans, and nearly all of them had Bible names."

"What was the full name of your maternal grandfather?"

"Levi Stevens."

"There you are again, another Jew name."

"But my grandfather Stevens was not a Jew; he was a Puritan, which is an extremely hard-shelled variety of

THE REV. HIRAM MAXIM.

He Preaches the Gospel
He opens the BAZAAR
MAP OF HELL
MAP OF HEAVEN
He takes the class at Sunday School.
"HARK! THE HERALD ANGELS SING"
He Leads The CHOIR.

HAVING BECOME A PROTESTANT, I ESSAYED TO WRITE A SUNDAY SCHOOL LECTURE, TAKING FOR MY TEXT THE GADARENE SWINE STORY. THIS FALLING INTO THE HANDS OF GEORGE A. STEVENS, THE ARTIST, HE SENT ME THE ABOVE SKETCH THAT I MIGHT SEE MYSELF AS OTHERS SAW ME

Christianity ; in fact, he had so much religion to the square inch that the neighbours called him ' Old Brimstone Stevens.' "

" But that is trifling with the subject ; they are all Jew names."

I then turned to my friend and said : " One of your names is John, is it not ? "

He replied that it was, whereupon I asked him if John were not a Bible name and a Jew name. He admitted that it was, but nevertheless he was not a Jew.

The official then continued his cross-examination.

" If you are not a Jew, what religion have you ? "

I replied that, like Edison, I never had any use for one.

He said, however, that no one was allowed to remain in Russia unless they had a religion.

I replied that in that case I should certainly have to find one, and asked him what particular brand he would recommend. De Kabath suggested that I was a Protestant, and I asked him if a Protestant were not someone who protested against something ; he admitted that such was the case.

I then said to the official, " Put me down as a Protestant, I am a Protestant among Protestants ; I protest against the whole thing."

That was the way I became a Protestant.

Since that time the Russians have purchased vast numbers of Maxim guns, and it has been asserted by those who ought to know that more than half of the Japanese killed in the late war were killed with the little Maxim gun.

While in St. Petersburg I was informed that I was to be presented to the Emperor, and I naturally supposed that His Imperial Majesty wished to see the gun more than the inventor ; nevertheless, the Russian officials would not

allow me to take the gun to the Palace. I then found that it was usual for all foreigners to be presented to the Emperor by the Minister of their country, and I accordingly applied to the American Minister. He informed me that the rules and regulations that he had received from Washington made it impossible for him to do so. He could only present high officials of the United States Government, and not private individuals.[1] As I had been entertained several times by the British Ambassador, I applied to him, and although he did not present me, he took the necessary steps so that I could present myself, and the American Minister wrote a letter certifying that I was a highly respectable American citizen.

When the great day arrived I put on evening-dress in the morning with the red ribbon of France as a decoration, and took the train for Gatchina, where I found a royal carriage and servants in livery waiting for me.

After we had been ushered in, the Archduke Michael, the uncle of the Emperor, looked me over, found me presentable, and soon presented me to the Emperor.

I conversed with the Tzar for about three-quarters of an hour, but he was greatly disappointed because I had not brought the gun. I told him I had tried to do so but that the officials would not allow it. I had, however, brought a large and elaborately bound album containing many photographs of Maxim guns, which I presented to His Majesty.

Lunch was served, at which I had my choice of many kinds of raw fish, after which the State carriage took me back to the station. After I had left Russia the Emperor

[1] The Russian officers could not understand why the American Minister should refuse to present me, especially as the Czar had expressed a wish to see me. They said: "C'est une chose extraordinaire, n'est-ce pas?" They asked why it was that we had a Minister in St. Petersburg if he were forbidden to perform the duties of a Minister.

came to St. Petersburg and the gun was fired for him by the Russian officers in the Riding School.

While in St. Petersburg, waiting to bring matters to a focus, I made a night trip to Moscow, and arrived there on the anniversary of the Resurrection. I had a Russian gentleman with me, and on seeing some of the natives kiss their horses and go over some ceremony to them, I naturally inquired what it was. I found that the driver in addressing the horse said: "Christ has risen," and the horse replied, "Indeed he has."

Moscow is the Holy City of Holy Russia, the Holy of Holies; while I was there religion was simply booming. When we drove out in a carriage I was told that I must take off my hat while passing under several arches, otherwise the natives might kill me with a club, and having no desire to be killed, I naturally uncovered.

I was surprised to find how many young clerics managed to fix themselves up to look exactly like the Christ of Leonardo da Vinci. It was rather startling to a man who had been brought up in a Puritan country.

At that time there were a good many horse-drawn tramcars, full inside and out, and every passenger had to make the sign of the cross several times in passing certain holy shrines and the numerous arrangements which are called in French "Bon Dieu." Of course, the faster the tramcar was moving, the more rapid were the movements of the passengers, and this reminded me very much of Christmas presents that I have seen in England, in which little figures are moved by the rotating wheel of a toy carriage.

I went to see the largest bell in the world, which was useless on account of a big crack in it, also a bronze gun some hundreds of years old with a bore of thirty-six inches

and the spherical stones that it was supposed to throw. The powder chamber was very much smaller than the bore of the gun, extending for a considerable distance to the rear.

It is not generally understood that the Greek Catholics, unlike the Latin Catholics, are not supposed to have any images of their divinities or saints; there are, however, innumerable paintings of the Virgin Mary arranged behind silver and gold foil which are known as icons. In Moscow there is one image of the Virgin Mary, the only one in Russia, but this was not made by man, it was handed down from heaven itself, and is, of course, the holiest thing in the holiest city of the holiest country of the world.

I was much amused in St. Petersburg. Having occasion to cross the Neva in a sleigh, I noticed a man working one of these icons at long range on the other side of the river. I was gone two hours, and on my return he was still there and still going through the performance.

Nearly opposite the Hôtel de l'Europe, where I stayed in St. Petersburg, there was a very large "Bon Dieu" or icon, said to be the largest in Europe. The interior was quite as large as a small bedroom and all lined up with gold. The paintings of the Virgin Mary and divinities were life-size, and there were many diamonds and precious stones set in the gold filigree. I was told that it was very difficult to prevent the *ultra-devout* from removing some of the stones with their teeth while kissing the feet or robes of the Virgin.

In St. Petersburg the houses are mostly very large, containing many flats, and there is generally a man at the front entrance all night. He would be called a concierge in France and a janitor in America. On one occasion two of these doorkeepers were discussing their family affairs, and one told the other that his old mother had saved two hundred roubles, which is about £21. Between them

they made up a plan to kill the old woman, and take her money, but before doing so they went to this big "Bon Dieu," bought two candles each about the size of a lead pencil, lighted them, placed them before the Virgin, and prayed for the success of their enterprise. They crossed themselves many times before the painting of the Virgin, then went home, murdered the old woman, and took her money.

I do not know that it has ever occurred to anyone that there is any relation between praying machines and pigs. At St. Petersburg the praying machines are of enormous size and very expensive, with candles and lamps always burning; there is one in every railway station. The pigs in that part of Russia have nearly all their weight on their forward legs, the head and long snout being nearly as heavy as the body. The praying machine in the St. Petersburg railway station is quite an imposing affair, but I noticed as we were travelling westward that the praying machines became smaller and smaller, and the noses of the pigs shorter and shorter, until we reached the German frontier, when the last praying machine was only about one foot square, with the lamp not burning, while the pigs had short noses very much like those found in England.

Part of the time that I was living in St. Petersburg I stopped at the house of our agent, Mr. de Kabath. There was a large praying machine in the entrance hall and a small one in every bedroom, but as the oil lamp in my machine gave off smoke and smell I used to extinguish it at night and take my chances. It was probably a very risky thing for me to do; nevertheless, my sleep was not disturbed by any ghostly influence.

On one of my last visits to St. Petersburg I took Lady Maxim with me, and it was very fortunate that I did, because I had a very severe attack of the grippe, which I

think is called influenza in England. We had a very expensive suite of rooms in the Hôtel de l'Europe. One evening, while sitting at my desk, a Russian official called. He sat down on my left side, that is, my deaf side, and as he was speaking in French, a language that requires very careful attention, I put my hand up to my right ear and turned suddenly about so as to catch his words. The quick movement of my body caused the elaborately carved black walnut chair that I was in to collapse into what looked like a pile of kindling wood. When the officer had left, my wife said, " Now, Hiram, you will have at least a hundred dollars to pay for that chair." I rang the bell, and when the servant appeared I went for him like a hurricane. I picked up the pieces and showed him that the chair had been broken before and glued together. I scolded him severely for having endangered my life by giving me such a chair. He apologised and explained that the rooms had previously been occupied by an English lord who was very drunk every night, and he had practically broken up all the furniture in the room.

We had arrived at St. Petersburg in the night, and when Lady Maxim looked out of the window the next morning she said, " This is the first time I have been in a place where I could not read the signs." She thought perhaps she might have better luck if she stood on her head, as everything seemed upside-down.

The man that waited on us at the table was a Tartar, and as both he and Lady Maxim spoke French fluently, we learned a lot about hotel life in St. Petersburg. She asked him why it was that all the waiters were Tartars and Mohammedans. He explained that it was because a Russian Christian could not be trusted where there was either money or wine ; they would steal the money and get drunk on the wine. He said they did not like Mohammedans

but were obliged to employ them. Straightening himself up and putting his hand on his breast, he said, "We are honest men; we do not lie, we do not steal, and we never taste wine." There were a good many very eminent people at the hotel. When asked if he did not make a lot of money he said, "Yes"; although the pay was small the tips were large, but he was always "just so poor." He said his family were very expensive; he had twenty-one children, whereupon Lady Maxim remarked that their poor mother must have a lively time of it. He said, however, that he had four wives, which was all that the Mohammedan law allowed.

Tipping servants in hotels is universal throughout Europe. On leaving the hotel our agent suggested that the servants should be tipped to the extent of one thousand francs. This was vastly more than I had ever paid before, and I objected. I, however, gave them five hundred francs, which in Paris or London would have been excessive.

When Li Hung Chang stepped ashore at Dover, almost his first words were, "I should like to see Hiram Maxim"; and shortly after this I called on him at the Embassy, having the secretary Loh Fung Lu to interpret for us. I met His Excellency several times in London, and it was finally arranged that he should go to Eynsford and see the guns fired. On the day fixed we provided a special train which took not only Li Hung Chang and his staff, but also a large number of prominent Londoners. Three Maxim guns of rifle calibre were placed in position, each provided with 333 cartridges. These were first fired singly, keeping up a continuous stream of fire until the whole thousand had gone off; then each was provided with another box of cartridges and all fired simultaneously, making a tremendous clatter.

The Pom-pom was then brought into position and His Excellency asked how many shots it would fire in a minute ; on being told that it fired at the rate of four hundred rounds per minute, he at once replied that he didn't believe it. However, the gun was loaded, the projectiles being explosive shells that went off on striking the target. When we had ceased firing he observed that the projectiles continued to strike the target, and when this had stopped, he still heard the reports. He at once came to the conclusion that there was some trick about it ; he thought we had some sort of a machine for producing the flashes and the reports and that the machine had continued to work after we had ceased firing. I then explained, as I had previously done for Lord Wolseley, that as the target was a thousand yards distant, there was a considerable number of projectiles in the air on their way to the target when the gun ceased to fire, and that when the last projectile had struck the target and had exploded there was a considerable number of reports in the air coming back from the target. He was satisfied, and as he had timed the gun with his own watch, he said it fired rather faster than four hundred per minute. He wished to see one of the cartridges, and when one of these were placed in his hand, he asked how much they cost apiece ; on being told that the price was six shillings and sixpence he said, " This gun fires altogether too fast for China " (£130 per minute).

The King of Denmark wished to see the Pom-pom fired, and when he had inquired the cost of cartridges, he said, " That gun would bankrupt my little kingdom in about two hours."

When my gun was first described in the Press I received some inquiries from the Shah of Persia and sent him a full description, which I think was written in French. Some years later, when the new Shah came to England, he was

A WHITE ASH TREE, 18 INCHES IN DIAMETER, CUT DOWN IN A FEW SECONDS WITH A SMALL MAXIM GUN IN THE PRESENCE OF CHINESE OFFICIALS.

the guest of the Queen at Buckingham Palace. He was very anxious to see the Maxim gun fired, and arrangements were made to fire it in the Palace grounds. When everything was ready one of the Palace servants in a most extraordinary uniform came to me and said :

" Mr. Maxim, do you wish for an interpreter ? "

I said that I was constitutionally opposed to interpreters, and asked if His Majesty did not speak French.

The high and mighty one replied, " Yes, His Majesty speaks French, but very bad French."

I told him that that would be quite all right, because " very bad French " was the kind that I spoke.

However, we got on all right, but the Shah could not exactly understand the name Maxim-Nordenfeldt, and when I explained he said : " Oui, maintenant je comprends—c'est maximum et minimum, n'est-ce pas ? "

The Grand Vizier was as much interested as His Majesty, and would persist in leaning over the muzzle of the gun while the Shah was working the mechanism to see how the cartridges were loaded into the barrel. However, by constant vigilance I succeeded in preventing any accidents, and when the Shah had fired a few hundred rounds he was satisfied.

In the meantime the Prince of Wales had sent word that the Shah would certainly ask me to make him a present of the gun, and this is exactly what happened ; but I was ready for him, and explained that the gun was not my property but belonged to the company, and that I had no right to give it away.

CHAPTER XVIII

WHEN the time arrived for me to take a gun to Constantinople there was a cholera epidemic in that city, and all railway communication had been stopped. It was therefore necessary for me to go via Marseilles in a very old and dilapidated slow steamer. This time I was accompanied by an English Admiral of the Fleet, retired, M. Zedzed, a clever and entertaining Russian gentleman, and an expert French mechanician who never got drunk. The ship was a very long one, with only a few cabins up in the stern ; we had sheep and cattle on board, a butcher's shop, a carpenter's shop, a paint shop, and a rather large machine and blacksmith's shop. The ship was also provided with a cat, and a monkey, who stood in great fear of the cat, which never lost an opportunity of punishing him severely. The monkey used to occupy a seat at table with the crew, and was always expecting that some trick would be played upon him. He never would touch anything until he had ascertained its temperature. It was really too bad that so many tricks were played upon this poor cousin of ours. My Frenchman at first made a great pet of the monkey, and for a time they were fast friends, but when the Frenchman got into the habit of buttoning the ship's cat inside of his coat and suddenly letting it out, the monkey gave him a wide berth.

I was rather surprised when we landed on some of the Greek islands to find the men going about in petticoats with

white starched skirts standing straight out like those of ballet girls. No sooner were we in port than the old woman who was a kind of a ship's housemaid would have half a dozen lines overboard for the purpose of hauling in fish. She generally caught enough in an hour to last the ship for about two days. On one occasion I landed, and as the ship would remain in port about three or four hours, taking on peas and the very small grapes which masquerade as currants in cakes or take the place of dead flies, I took a walk inland. There was an immense quantity of dates hanging from the trees, which I did not want, being in search of grapes. I was pestered by a guide, the most persistent fellow that I ever saw. He jabbered away to me in French, finally offering his services at the low price of one franc, but although I declined he still stuck to me like a tax-collector. Just before I returned to the ship I saw an old woman with an immense basket heaped up with beautiful grapes. I bought practically all I could carry for fifty centimes, whereupon my would-be guide told me I had paid vastly too much, that I had been swindled, and that he could have purchased the same amount for twenty centimes. However, I had enough grapes for almost everyone on board, and was comparatively happy.

About two days before we reached Constantinople an old and fat Turkish woman came on board. She spread out a carpet on the top of one of the hatchway covers which was about three feet high, got out numerous little coffee-pots, a plentiful supply of cigarettes and matches, and folding up her legs sat down, the image of contentment. She spoke a few words in French, and every time I passed she begged me to take some of her coffee or a cigarette. Her coffee cups were about the size of large thimbles and the coffee as black as ink, but as I had never tasted tobacco

in my life, and never drunk coffee, I declined respectfully. When night came on one of the petty officers told the old lady that she would have to go below, as no ladies were allowed on deck after ten o'clock at night. She declined. He then brought one of the mates, then two, and as these gentlemen were unable to make any impression on the old lady, who only bowed and smiled, but still declined to go, they sent for the captain. He was a rather pompous individual, who told her that according to the rules and regulations of the company who owned the ship no ladies were allowed on deck after ten o'clock at night ; therefore she must certainly go below into the ladies' cabin. Still she only smiled and bowed, and I understand that she actually remained in possession all night, in fact, all the time until the ship reached Constantinople.

Having arrived in Constantinople, we were invited to the house of a French gentleman. At dinner his wife said to me that she was in Paris about five years before and returned by way of the Mediterranean on a very old and dilapidated ship, which then, according to her, was making its last trip. I asked her the name of the ship, and sure enough it was the very one on which we had come ourselves.

I was constantly being taken for a missionary in Constantinople ; they could not understand how an American could be anything besides a missionary, or at least a teacher.

While waiting for the Turks to get ready for us we paid a visit to Scutari in Asia Minor. We went over in a Turkish boat with a name that sounded like " cake," but returned in a Greek boat. Just before landing, in running through a veritable fleet of boats, we collided slightly with a Turkish boat, when the boatman hissed something very fiercely through his teeth, of which I understood but a single word, namely, " Nazarene." I then asked M. Zedzed, who was

with me at the time and who spoke all languages, for an explanation, which he gave to the effect that the Turk had called me "a miserable unbelieving infidel dog of a Christian." I then thought the matter over, and discovered that there was no question about it; I was certainly an infidel in Turkey, because I did not accept the prevailing religion of that country, so I told my friend that the Pope of Rome, the Archbishop of Canterbury, General Booth, and the Grand Llama of Thibet, as well as myself, were all infidels in Turkey, and that it would be impossible for anyone to take over any religion that would not make him an infidel in at least three-quarters of the world.

Among the guns that I took to Constantinople was a Pom-pom—a 37 mm. gun mounted on a cone for naval purposes. In order to fire this on the field it is necessary to find something very heavy to which the cone can be attached. I found a very large piece of timber in one of their military depots and had about a dozen soldiers detailed to assist me. They worked like Trojans, boring the holes for the bolts with some old augers that had been worn out by Noah when he built the Ark. After a great deal of labour the job was finished, and I sent out a twenty-franc piece and had it changed into silver, which I handed to the sergeant to distribute among the men. He looked surprised and did not know what to say; the men would not accept the money, and one of them, a private, came forward and made a neat little speech in French, which in English would be about as follows: "We have done nothing that it was not our duty to do, and certainly Mr. Maxim does not expect that we, Turkish soldiers, will accept pay for doing our duty." I had offended their dignity, and they handed the money back to me. This would never have happened in any other country on this planet.

At the trials, which were a long distance out in the country, the weather was very hot, and the firing attracted a crowd of all sorts, sizes, and conditions of men. As I didn't want to have the cholera I drank nothing but mineral water bottled in France. At the end of the firing, being very dry, I had a bottle of this opened for me, and, pouring it out into a glass, I continued drinking until the bottle was finished, very much to the surprise of the bystanders, a good many of whom were Greeks. They passed the bottle round and smelt it, expressing every symptom of absolute disgust. As there was no hotel, I was given permission to sleep on a seat in the railway station. Finding the seat very hard I thought I would take a walk about ten o'clock at night, but I had not gone more than a hundred yards from the station when someone touched me on the back. It was the station master, who said, "If I were in your place I would not go very far from the station; I have noticed a good many Greeks hanging about here to-day, and some of them seem very much interested in you." I perceived at once that I was in a country where brigands were not unknown, so I stuck to the station during the night and continued my firing the next day.

While in Constantinople I became acquainted with the editor of the *Levant Herald*, who consulted me on various occasions. One day he asked me to go to his office as early as possible. If I remember rightly his paper was half in English and half in French. He said he had his forthcoming issue set up and a few copies printed and submitted to the censor, who had forbidden the publication of a certain article. He showed me the article, and on reading it I found that it had been copied *verbatim et literatim* from an article written by the great French astronomer Flammarion, in which he told his readers that the Earth would pass through

the great meteoric belt in November, and that we might expect a very brilliant display. He had something to say about the nature of falling stars, such as we often see in the English papers. The censor had objected to this on account of the reference to falling stars, saying that anyone could see it was only a covered attack upon the Sovereign ; that it was simply a prophecy that His Majesty the Sultan would fall in the coming November. Consequently he could not allow the article to be published.

Deaths from cholera were constantly taking place all over the city, and the Sultan is said to have spent fully £100,000 in disinfectants, principally crude carbolic acid. The ignorant people, who regard the Sultan very much as Roman Catholics do the Pope, that is, as the earthly representative of God, imagined that the carbolic acid must be a good thing for the cholera ; so whenever one was taken with this dread disease, they used to scrape up some of this thick, greenish material from the gutter, prise the patient's mouth open, and administer a dose very much against his will. The united effects of the cholera and the carbolic soon ended the matter. They did not, however, always wait for the patients to die before they buried them, and it is related that an Englishman, watching at the burial-place, succeeded in rescuing and saving quite a number of lives.

It was reported that a man had been taken and died almost instantly at a large drinking-place quite near our hotel. The next morning, walking past the place, I saw it was closed and in charge of soldiers. My French mechanic was leaning against the wall, and said, " I am going to have the first drink in this hotel after it is opened, and set the example for others."

Much has been written of the Constantinople dogs.

They are, for the most part, rather large and yellow, and probably all dogs, if left to themselves and to natural selection alone, would degenerate in a few hundred years into this particular variety. As far as I could see they have the town mapped out into lots of about four blocks each, and the dogs belonging to one lot or county are not allowed to trespass on others. Returning from a long walk one Sunday morning, I saw an Englishman walking in the same direction, who had with him a very large, beautiful dog. She was a Great Dane, partly brindled, partly of a dazzling white, and was extremely tall. She was on a leash, and on entering one of the dog-counties was pursued by a howling mob of yellow dogs, snapping at her heels, but not touching her. The hubbub was sure to attract the dogs in the next county, and they would assemble on the line ready to receive her, and would follow her up for two blocks, where she would be met by another gang. Each time the number increased, but while things were at their worst the Great Dane, who was very nervous and much annoyed, was released by her owner. Her persecutors knew exactly what this meant, for when she turned round and looked at them they scampered away, and in a few seconds there was not a yellow dog to be seen.

I was asked to take lunch with a high official to whom, I was told, the Sultan had just made a present of a very beautiful Circassian girl. It appears that the Sultan had found it very expensive to take over the conventional number of young ladies due to his exalted rank. Each one had to be furnished with gorgeous apartments and at least four servants, which meant expense. When, however, he attempted to limit the number, he was warned that it might cause a revolution. Many of the leading families in the Caucasus had stall-fed their most beautiful daughters with

a view to their becoming inmates of the Sultan's harem, and it was sure to occasion a great deal of trouble if he refused to receive them. The Sultan had therefore to do the next best thing; he accepted them and afterwards presented the superfluous girls to the high officers of State, some of whom, I suppose, might have passed them on to the next in rank. Someone intimated to me that the Sultan had a high opinion of my ability, and that he intended to decorate me, which he did, and in all probability would make me a present of one of the rarest gems of the collection in his harem. I was asked what I would do with it when it arrived.

Just before we left Constantinople and while I was reading my newspapers in the hotel, suddenly everybody's hair seemed to stand on end—something alarming had happened. Several Turkish officers, I discovered, had brought some kind of a mandate from the Sultan, and I think the hotel people were greatly relieved when they found that I was the man at whom this mandate was aimed. It was written in French and amounted to this: "A ship has arrived in the Bosphorus which has on board a considerable number of Maxim guns. The Sultan demands that these guns should be disembarked at once, as he cannot permit them to go up the Bosphorus, where they might fall into the hands of his enemies."

As my Russian friend, our agent, and the Admiral were all absent, I asked the hotel proprietor what I had better do. He said he would furnish me with a dragoman who spoke all languages, and in about twenty minutes this individual arrived. He was a Montenegrin, and if not seven feet tall, was very near to it. He was dressed in light-coloured blue woollen goods, with a lot of silver braid and silver buttons. He had two old-fashioned pistols, with an immense amount

of silver filigree about them, and a large collection of daggers of the same variety. I started out at once to go down to the harbour and see what I could do. I first commenced to talk to my dragoman in English, but he could not understand a single word: I then fired off my poor French, but only with the same result. At last I took this gentleman into Thomas Cook and Son's office, where they told me that he only spoke Turkish and the language of his native country. I asked them to pay him off, and they supplied me with a man who spoke French.

I concluded that the best thing I could do would be to see Sir Clair Ford, the British Minister. I had met him many times, and I think there was a rather strong friendship between us. He at once put his steam launch at my disposal.

There were many ships riding at anchor, but at last we found the right one. I went on board, showed the captain what I had received from the Sultan, and warned him that he must not attempt to take the guns through the Bosphorus. The guns were landed, and as our Admiral insisted that we had a perfect right to send guns through the Bosphorus, the Sultan took them and paid for them himself.

In Constantinople I was known as "The State of Maine Yankee with no civilized vice." There were so many things that I did not do, that they seemed to be surprised, and on one occasion an English-speaking official said to me, "Hang your guns, we don't want guns. Invent a new vice for us and we will receive you with open arms; that is what we want."

For a few days I employed a very intelligent Turkish Secretary. It was his business to translate what I had written into the Turkish language. He brought his own ink and paper, a very sharp little knife, and some small reeds which he made into pens. He spoke English very

well indeed, and often claimed that the Turks were the most liberal-minded people in the world in regard to religious matters; that a man was allowed to have any kind of religion he liked in Turkey or no religion at all, which was not the case in some other countries. In England, he said, men had been sent to prison in recent years on account of their religion, or the lack of it. I had to admit that this was true, but assured him that it was not true in France.

As all the railways were still blocked it was necessary to return by the Mediterranean, which happened to be very stormy at the time, and I was extremely glad when we landed in Marseilles.

CHAPTER XIX

HAVING finished some of the gun trials in Central Europe, I returned to Paris, where I was joined by Lady Maxim, who had come over from London to meet me. The company was desirous that I should proceed at once to Spain, as the guns had already arrived there ; so after remaining only one day in Paris I took the night train for Madrid, and a few days later everything was ready for the trials.

The first day's trials were to be with a fully automatic 37 mm. gun—" The Pom-pom." I was on the ground early in the morning, and found a very heavy foundation where fortification guns had been fired ; to this I bolted the cone of my gun ; it was very solid, and I was sure of making a good target. I then sent a young officer, who spoke French, to the target, which was twelve hundred metres away. I sighted the gun according to the markings on the sight and fired three rounds slowly. The officer then, with his hat attached to a long pole, placed it over the holes which I had made in the target ; I adjusted the sights so as to bring them into line with the hat, and then with a penknife marked the sights and found that they were not exactly like the markings that had been put on at the works. This was repeated at the eight hundred metre range, and by this arrangement the projectiles would always hit the spot aimed at.

At two o'clock the Spanish officers put in an appearance,

and I fired fifty rounds automatically at the rate of four hundred per minute, making an exceedingly good target. I had aimed directly at the bull's-eye after the hat had been taken away. I then fired another fifty rounds at a target eight hundred metres distant, again making a good target; but when a gun is fired so rapidly every particle of metal in it is in a state of violent vibration, so that the hits are bound to be spread over the target. The next order was to fire fifty rounds deliberately at a fresh spot on the target; this time I fired slowly, never pulling the trigger until the gun had ceased to vibrate, and made an unbelievable target. I had made a rectangular hole in the target about twelve inches wide and five inches high; almost everybody would have said that it ought to have been twelve inches high and five wide, but it was not. Even Nordenfeldt was in doubt about the small size of the hole that I had made. I did not take anyone's word for it; I actually ran down to the target and back again, and the Spanish officers were much surprised to see a heavy middle-aged man get over the ground so rapidly.

The next day the trials were with the small rifle calibre Maxim gun at a distance of one thousand metres. I was allowed to make a few trial shots, which didn't hit the target at all, although it was as big as the side of a house. The wind was blowing a gale, and I kept moving the gun to the left until I compensated for the wind, and hit the target, but the gun was actually aimed at least twenty feet to the left of the target. We then waited for the officers to get ready and give the word. I fired a belt of 333 cartridges without hitting the target once, the wind in the meantime having changed to the opposite direction. However, we finally got on all right, and we hoped that the morrow would be more favourable.

When I arrived on the ground the next day, there was a company of infantry firing from the other side of an earthwork which was rather steep, and in order to scale this I went for it at a gallop. However, when I had got about half-way to the top I slipped backwards, and, digging my toes into the earth, broke one of the muscles of my leg, and fell helplessly to the ground. Six Spanish soldiers had all they could do to remove me to the hospital which was near by.

The doctor told me what muscle I had broken, adding that my foot and the lower part of my leg would be black in about four days. He did it up in bandages and I was taken back to the firing ground. Improvising an artificial leg out of a cane-seated chair I went on with the trials, walking about with my knee in the chair, but I finished the job all right. The Spanish officers said that this little affair showed the kind of material Americans were made of.

After I had remained for some weeks at the hotel the doctor thought it was safe for me to leave Madrid. In the meantime I had received a telegram to go direct to Spandau, near Berlin. My leg troubled me all the way.

The Germans had a Pom-pom (37 mm. gun), but were quite unable to make it work. They had provided their own cartridges, and these were loaded with some sort of explosive in which nitrate of ammonia was used. When a shot was fired about a spoonful of the melted products of combustion remained in the case, looking very much like melted iron. If the case were allowed to remain in the chamber for a few seconds after being fired this material would have solidified and been drawn out with the case; but in the Maxim gun the case is instantly extracted, and this is done so quickly that the melted material is left in the

chamber, which of course prevents another cartridge from entering.

I could do nothing to remedy the trouble except to advise a different kind of cartridge, which I offered to furnish. The gun had already been successfully fired with our own cartridges, and they were satisfied ; so I returned to England, taking my bad leg along with me.

However, it got better in time, and then I was notified that experiments were about to be made at Cadiz in Spain, with a view to the introduction of our guns into the Spanish Navy. Again I started for Spain, stopped one night and part of a day at Madrid, where I took a train for Cadiz. From some cause or other it only went as far as Seville that night, and there was no train to Cadiz until noon the next day.

Seville is a very interesting town, and I wished to see as much of it as possible before the train left. I was very fortunate in running across an Englishman who had studied the guide-book and knew all about the town.

After purchasing some of their celebrated oranges, he suggested that we should pay a visit to the Government tobacco works, the largest in the world, where nine thousand operatives were employed.

When we arrived at the works and had obtained permission to view, by paying a small fee, a guide took us in hand, but as soon as I entered the factory the smell of tobacco was so strong that I stopped and suggested that my friend should see it alone.

" Nonsense," he said ; " you will get used to it in a little while. Come on."

So I went in. There was an immense number of young women making cigars and cigarettes, but what attracted my attention most of all was the number of cradles and

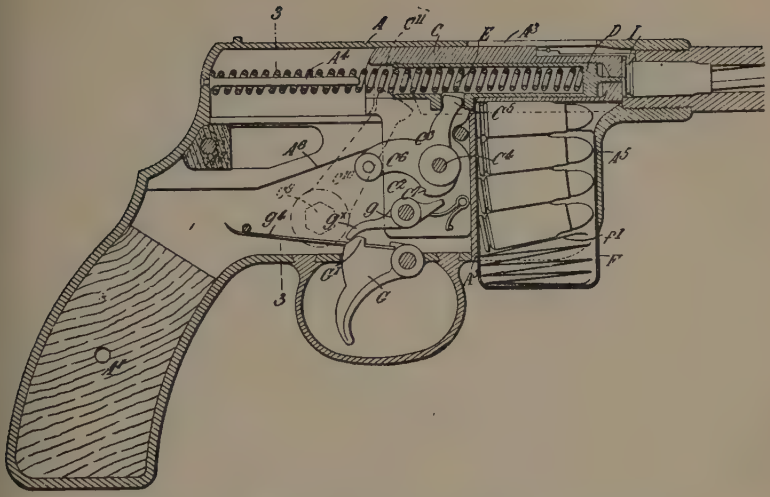
baskets with babies; about a third of the young women seemed to have a baby to take care of while they were working.

At Cadiz the trials were very successful, with no hitch of any kind.

I was astonished at the extraordinary size of the prawns at this place, some of them being fully eight inches long; and as they were delicious I thought it would be a good plan to take a few of them back to Madrid with me. I purchased some in a paper bag, put them in my overcoat pocket, forgot all about them, arrived at Madrid in the night, and went to bed. The next morning my friend, M. Zedzed, came into my room, and at once commenced to open the windows and doors, saying that the grippe, from which I had recently been suffering, had left my throat and nose in a very bad condition, and he advised that we should call in a doctor at once. When I protested, however, he traced the smell to my overcoat; it was the prawns and not my throat that had gone bad.

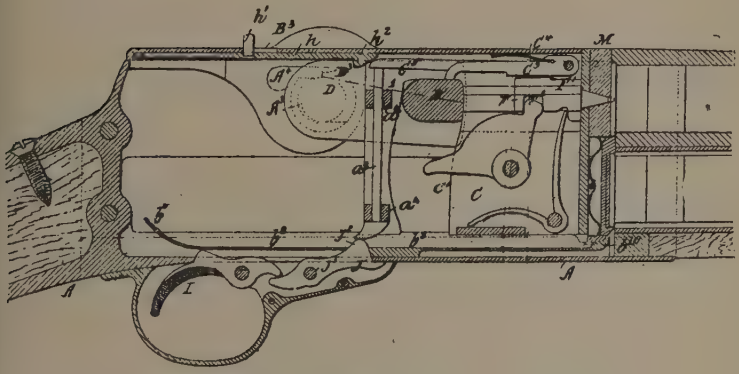
The trials in Portugal were about the same as in Spain. The King himself fired the gun and conferred upon me a high decoration.

We purchased an old gun factory at Plencia in Spain. There was also a small factory there in which they made very cheap imitation Winchester rifles; nearly all of the breech action was made of malleable iron castings, and the barrels were very largely those that had been rejected at the various gun factories in Europe, or the barrels of condemned and obsolete military rifles. The gun itself when finished looked very much like a Winchester rifle. On examining it I found that it was stamped with the dates of all the patents on the Winchester rifles, and was told that the Africans, who were their best customers, would



THE AUTOMATIC SYSTEM AS APPLIED TO PISTOLS

The automatic system applied to a pistol in connection with a Lee magazine.



THE AUTOMATIC SYSTEM APPLIED TO SHOT-GUNS

The automatic system applied to a shot-gun, the magazine being underneath the barrel, after the manner of a Winchester rifle.

not purchase a rifle unless it was stamped with lettering exactly like that on a real Winchester rifle.

When I had perfected my gun in Europe I wrote to all the prominent gun and pistol makers in the States telling them that the automatic system would soon be applied to firearms of all sizes from pocket-pistols up, and advising them to work my system, which had been broadly patented in the States. I did not receive a single favourable reply, in fact, I might say that the replies were scurrilous—they ridiculed the idea : but at the present time I think every maker of firearms in America is using the automatic system. The patents, however, have expired.

I think it will be admitted by the readers of this book that the lot of the inventor, even if he has something that is radically new and very valuable, is not "all beer and skittles." Property in patents is not respected by the majority of mankind as other property is.

SHOWING THE GUN TO MY GRANDSON

CHAPTER XX

WHEN Lord Wolseley first saw the Maxim gun fired at Pirbright he was amazed at the cloud of smoke that it produced, and told me that I ought certainly to find a smokeless powder for my cartridges. Others said the same thing, and when I was called away to Vienna one of our directors who saw me to the station said :

" Now you will be on the train several days ; you will have plenty of time to think, and when you arrive in Vienna sit down and write to me, telling me exactly how to make a smokeless powder."

I told him that there were many much better chemists in London than myself, and that I only understood as much chemistry as an electrician was expected to know.

But he insisted. " These men may be much better all round chemists than you are, but you certainly know all the chemistry there is regarding powder ; moreover, you have an imagination, which they have not, so write to me."

I did as he requested. The first evening I was at my hotel I sat down and wrote a very long description of how a smokeless powder could be made. Gun-cotton of the highest degree of nitration was to be employed, and this was to be dissolved or softened with ether and acetone, solidified, and cut up into proper-sized grains. On my return to England I made some powder according to this

specification ; it worked very well when freshly made, bu when kept for a considerable length of time, it becam lighter-coloured and produced very high pressures. I sav at once that it did very well when freshly made, becaus it contained some of the solvents, and that when the sol vents were completely dried, the powder became violent i its action. I then added to the solvents a small quantity of castor oil ; of course, this could not dry out, and th powder made in this way remained stable.

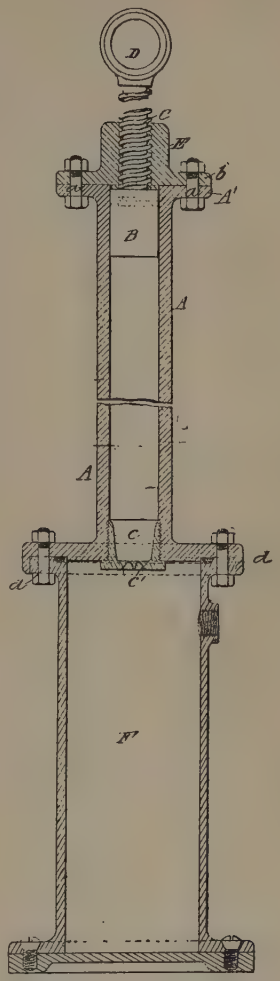
I had had something to do in the way of inventin powders before this. On January 14th, 1885, I took ou patent No. 552 for charges of powder having perforate grains, in which the rapidity of burning was varied by th size of the grains of nitre in the compound. On February 14th, 1885, I took out another patent for a progressiv charge, the number being 2090. In this patent a progres sive powder charge was shown having multiple perforations On May 30th, 1885, I took out patent No. 6591 for a larg gun for throwing aerial torpedoes. I designed this gun and the projectile to use an explosive composed of nitro glycerine and true gun-cotton. In the preparation it wa spun into fine threads. As I could not make this explosiv in London, I went to Glasgow and had it made at the Nobe Works by Mr. MacRoberts, the works manager. I though that perhaps this material, which had been made into fin threads, might be used as a propelling charge in small arms but when I mentioned it to our military adviser, he told m that no nation on earth would look at a powder tha contained even a trace of nitro-glycerine. However, I wen on with my experiments, and found that nitro-glycerin could be used with perfect safety. I made some excellen smokeless powders, containing true gun-cotton and nitro glycerine, with a small quantity of castor oil, which powder

have never been surpassed in efficiency. Some were tested in England and others sent to America.

Shortly after I had sent a quantity to Springfield, Mass., U.S.A., I met Mr. Marcellus Hartley, a large dealer in fire-arms in New York, and I remember what he said to me on that occasion: "In electricity or mechanics we would have backed you against anyone in the world, but we did not expect much of you in the way of chemistry. However, we find by the reports that of all the smokeless powders tried at Springfield, yours has proved the best. This is a feather in your cap, but don't imagine that there is any money in it for you; the officials may not be clever enough to invent a powder, but they are quite equal to imitating one."

As soon as I found that nitro-glycerine could be safely used I applied for quite a number of patents, No. 16,213 of November 8th, 1888, being the most important.

But there were others working on the same kind of powder.



FIRST APPARATUS EVER MADE FOR PRODUCING CORDITE

Patented February 19th, 1887.

With this simple device I made cordite, identical in size and appearance to the Government cordite, several years before cordite was re-invented by Professors Dewar and Abel.

Professors Abel and Dewar applied for a patent almost identical with my own, but fourteen days too late. Shortly after this, the British Government commenced to make cordite, which was practically the same thing that I had made in Scotland years before, the composition and the diameter of the cords being almost identical. However, the Government cordite factory had not been in operation long before the Government was sued by Nobel. Nobel claimed a smokeless powder made of a peculiar form of nitrated cotton generally known as collodion cotton. This was soluble in nitro-glycerine, and he contended that it was a gun-cotton and nitro-glycerine powder, but Sir Richard Webster, who represented the Government in this so-called "great cordite case," repeatedly asserted that "Hiram Maxim was the first to combine nitro-glycerine and true gun-cotton in a smokeless powder," and this was the decision of the court that defeated Nobel. The court also decided that Nobel's powder did not contain gun-cotton.[1]

The most reliable of all engineering publications in Europe is without doubt *Engineering*, edited and published in London by William H. Maw and B. Alfred Raworth. In their issue for January 27th, 1911, will be found a very exhaustive article relating to the invention and early history of smokeless powder. They obtained all the available data in England, France, and America, and the following is the conclusion to which they came at the end of their long and carefully written article:

"A casual glance at the Patent Office records is quite

[1] In this great lawsuit all the patents ever taken out on smokeless powders were thoroughly examined, and I was the only American that was found to have done anything whatsoever in the early invention of smokeless powder.

sufficient to put the matter of smokeless powders in its true light. Sir Hiram Maxim appears to us unquestionably to be the inventor of the class of powder used in the United States at the present moment. This, we believe, is disputed, but since new powders are always patented there should be no difficulty in procuring evidence as to the subject, if it exists. If the records of the Patent Office do not furnish the material we may be fairly certain that our opinion is correct."

I know to a certainty that all of the first powders exhibited in the United States were invented by me and sent over from England, and also that there is no patent in the world on a smokeless powder containing nitro-glycerine and gun-cotton that antedates my own.

There are many kinds of nitrated cotton but only one is stable, and this is what is known as tri-nitro-cellulose. For many years it was believed that there was no stability in nitrated cottons; they are liable at any time to give off nitrous fumes and explode spontaneously. It was an Austrian chemist who first discovered how to make a stable gun-cotton, and this is the kind made and used by the British Government in all of their smokeless powders. Nitro-glycerine when well made can be depended upon to keep, and a mixture of nitro-glycerine gun-cotton and oil makes a powder that can be relied upon to keep in any climate and for any length of time, provided, however, that the quantity of nitro-glycerine is not over 40 per cent.

When the French Government commenced experiments with the Pom-pom everything worked perfectly well, except that with the short cartridge employed they were unable to obtain the desired velocity. When I offered to furnish a

powder that would give the velocity without exceeding the pressure admissible my offer was accepted. I made my powder into small thick tubes, the hole being very small, and cut the tubes into lengths of about a quarter of an inch.

I found that the French had been using a small bag of black powder near the primer to set off the smokeless powder, which was the cause of so much smoke that it would sometimes obscure the target. I determined to remedy this. As soon as I returned to England, I obtained some strong and heavy closely-woven cotton canvas, which I boiled, made chemically clean, and dried. I then dipped it in a solution of nitrate of soda, dried it and nitrated it in the ordinary way, and cut out little discs one and a half inch in diameter to be used as primers. When I took the primers and the powder to Paris I obtained the necessary velocity without exceeding the pressure admissible, and what was more, I got rid altogether of the smoke which was due to the black powder primer.

The French officials asked me if I had nitrated the cotton first and then spun and woven it into canvas. I told them that I had not, but had nitrated the canvas, which they said at once was impossible, as when the cotton was very dense it could not be made into tri-nitro-cellulose, but only into di-nitro-cellulose, which was unstable and would not keep. When I asked them what test they used for the gun-cotton, they answered that they placed it in a mixture composed of equal parts of strong alcohol and ether. This would completely dissolve all the unstable varieties, but would not touch the stable tri-nitro. I asked them what, in percentage, the real gun-cotton ought to shrink by this treatment, and they placed it at about 2 or 3 per cent. They then tried my nitrated discs, and found that

they were the purest tri-nitro-cellulose that they had ever seen, the shrinkage being hardly perceptible. I revealed to them the secret of the process, after which they had no trouble.

While in Paris I visited the works of Bariquand et Fils, who told me that they had great trouble in making tools that would work accurately enough to make what they called " the fret," that is, the little jackets that were shrunk on to their rifle barrels after the manner of larger guns in England. They said the work was difficult, because, being so small, it had to be very accurate. It was no trouble to do a few, but when a million were to be provided it was a decidedly long and difficult task.

On being asked why they made the barrel two thicknesses at the breech, they said that their new powder gave a pressure of three thousand atmospheres, and that the only way to make a barrel that would stand this was to shrink on a strong piece of steel at the breech.

I offered to furnish them with a barrel that would stand the test. I made it of a choice bit of Vickers' steel, and when it was finished I mounted it vertically in a small gas furnace, allowing a current of coal gas to flow through it while it was being heated. This, of course, prevented the oxidization of the inside of the barrel. When the right temperature had been reached I turned on fish oil under pressure, extinguishing the gas, and, of course, the barrel was cooled down from the inside ;[1] as the inside was the first to cool, the outside was shrunk on to it after the manner of the old cast-iron Rodman gun of the American Civil War. This barrel stood the test perfectly ; in fact, it would stand almost any test that one could imagine, except

[1] The barrel was rotated slowly in the furnace. The heating was thus equalized and the barrel kept perfectly straight.

pure nitro-glycerine. I was told that this saved a lot of expense in the making of the Lebell rifle.

On another occasion, having been with a lot of officers all the forenoon, a fellow-director, who happened to be with me at the time, invited them to take lunch with us at the Café Anglais. There were three French officers present who were telling us in their own language of a very wonderful explosive that they had discovered; it was stronger than dynamite, and nearly as strong as pure nitro-glycerine, but unlike these explosives it was perfectly safe; in fact, the rough treatment that it would stand was unbelievable. It could be stirred up with a red-hot poker and would not go off. They had actually melted cast-iron and poured it into a pot containing the new explosive, and it simply burned like so much pitch. They had thrown packages of it into a white-hot furnace and it did not explode; but if loaded into a very strong receptacle like a bombshell, and set off with a powerful fulminator, it exploded with great violence; the disruptive effect was surprising.

My fellow-director touched my foot under the table as though intimating that I should remember what these gentlemen were saying.

About that time a tall gentleman entered the café. He had on a fur-lined overcoat with the most remarkable collar I had ever seen, and one of the officers told us that the collar had been purchased in St. Petersburg at the price of twenty-five thousand francs, that is £1000. They informed us that he had made an immense amount of money recently, and was going in for all the good things of this world. When my friend asked how he had made his money, the reply was, "He went to England—purchased every kilo of crude phenol that he could find, and sold it to the French Government."

My friend again touched my toe and the conversation proceeded.

They told us that this explosive could be struck with a sledge-hammer on an anvil and would not go off, that a projectile loaded with it could be shot through a hard steel armour plate, and that even this shock would not set off the explosive.

This was certainly wonderful, and as soon as we found ourselves alone my fellow-director asked me if there was any connection between phenol and high explosives?

I told him that phenol was what was vulgarly known in England as carbolic acid, that this acid, when treated the same as glycerine, was converted into tri-nitro-phenol, known generally as picric acid, that originally this chemical was prepared from indigo, that it had been used in the arts for two hundred years before it was ascertained that it was an explosive, although chemists knew that it contained all the elements of a very violent explosive, and that some years ago, when there was a big fire in a chemical works in Birmingham, there was a terrific explosion of a force and character that seemed amazing, for which no one could account. Some suggested that it must have been the picric acid that had exploded, so they made the experiment and found that, when this remarkable explosive was set off with a strong fulminating cap, it behaved exactly like dynamite, only with greater force. It was probable that it was stored in close proximity to fulminate of mercury, and that when the fulminate exploded the picric acid joined the procession, going off at about the same rate of burning.

We both thought that we had found out the secret, and as soon as I returned home and before going to bed that night I experimented with picric acid, as I happened to

have a considerable quantity in my laboratory at the time. I found that it would stand any test suggested except being struck with a sledge-hammer; if struck hard enough it went off like a fulminating cap.

The next day, taking advantage of my experience with other explosives, I mixed a little vaseline with the picric acid, and then found that it stood all the tests claimed by the French; but later on, I added a quantity of di-nitro-benzol, which with a small quantity of vaseline was found quite effective, reducing the melting point, so that the new explosive could be melted in boiling water and poured into the projectiles just like so much treacle.

This, together with a delayed action fuse that I had invented years before, made it possible to produce a large projectile that could be shot through armour-plate and would go off after it had passed through, while the Lyddite made in England would explode by shock before it went through the armour plate.

This new and powerful explosive, which was first discovered in France and called "Melinite," and was afterwards rediscovered by me in England and called "Maximite," was re-invented by many others later on and called "Dunnite," "Smithite," "Jonesite," or "Bugginsite," always bearing the name of the last man who re-invented it. It was also re-invented in Japan, and if I remember rightly was called "Hashite." It seems to have done very well in the States under the name of "Dunnite." It was so very simple a matter to prepare this explosive that anyone could do it.

But the Americans were not so successful in making smokeless powder for large guns. I had experimented in England with multiple perforated grains of powder and found that they were likely to produce phenomenally high

pressures. Sir Andrew Noble also made experiments, and said at a lecture delivered in London that it was a very interesting form of powder, but liable at any time to produce formidable, unexpected, and dangerous pressures. The Americans, however, had not found this out, and did not find it out until after they had destroyed many valuable guns of large bore, and killed a considerable number of men. When I wrote to them on the subject and pointed out why it was that this form of powder was dangerous, they did not by any means agree with me ; but ultimately the whole batch (over 200 tons) was condemned and ordered to be destroyed. Instead of throwing it into the sea or burning it up, it was spread out over the land and ploughed in, and as the cotton had not been properly nitrated, it gave off nitrous fumes, just the thing required to support vegetation. According to the newspaper reports amazing crops were produced :

" In the earlier days of the Navy, when guns were manufactured of cast iron, and a fine-grain black powder was used, gun explosions frequently occurred, and it was very generally prophesied that when a charge was made from the large-grain prismatic powder—some of which was known as ' brown powder '—and nitro-glycerine and gun-cotton powders entered into use as a propellant, there would be a renewal of disastrous explosions. As far, however, as Europe is concerned, very few guns have been destroyed by smokeless powder, while in England practically no accidents of the kind are on record. Such is not the case in regard to America, where disastrous explosions, frequently accompanied by loss of life and destruction of property, have happened. We herewith give a list of guns which have been destroyed in the American Navy during the last ten

years, and from this it will be seen that fifteen guns have been destroyed by smokeless powder.

List of guns which have exploded in the American Navy, 1901 to 1910.

12-in.	gun,	April, 1903.
12	,,	January, 1905.
12	,,	February, 1906.
12	,,	November, 1908.
12	,,	September, 1910.
12	,,	September, 1910.
8	,,	February, 1904.
8	,,	February, 1904.
8	,,	March, 1905.
8	,,	January, 1907.
8	,,	January, 1907.
6	,,	February, 1900.
6	,,	November, 1908.
5	,,	April, 1905.
4	,,	December, 1902.

"Among the American officers in command there are a number who attribute the result to the quality of the steel, or to the guns being too light in the chase, but in one case at least a large and heavy mortar for the fortification service was blown into fragments with multi-perforated smokeless powder, and certainly this short and heavy gun could not have had a thin chase. It has been explained that explosions have happened owing to seams or cracks in the steel and to a faulty design of the gun, while other explanations trace the explosions to the fact that the perforated powder occasionally breaks up into fine scales, and becomes virtually a fine-grain powder, thus producing extremely high pressures. On the other hand, the fault

according to some theories, lies in the shape of the grains, the multi-perforated grains being found inherently bad, thus stating that the real cause is that which we set forth in a former article. A curious fact to which we may again call attention is that with multi-perforated powder hundreds of rounds can be fired with uniform results, when suddenly, without any rhyme or reason, the pressure will mount to a point which the gun is not able to stand. As Sir Andrew Noble said, ' The multi-perforated powder is a very interesting powder, but it is always liable to produce extremely high pressures,' and Sir Andrew is not the only artillerist in England who arrived at the same opinion from actual experiment." (*Engineering*, January 27, 1911.)

The true cause of these disastrous explosions is not far to seek. When smokeless powder is in rods or blocks, it only burns from the outside. The rate of burning increases as the pressure increases, and as the pressure increases, it, in turn, increases the rate of burning—one reacts upon the other. To compensate for this the blocks or rods of powder are always getting smaller, thus diminishing the burning surface, and under these conditions phenomenally high pressures do not occur. When, however, the blocks are perforated with many small holes, the burning surface increases as the charge is consumed ; and thus there are three agencies that have a tendency to react upon each other and increase, and no agency to prevent a rapid rise in the rate of burning and in the pressure. It is a lack of knowledge of these facts that has caused so many disastrous explosions in the States.

CHAPTER XXI

WE will now return to Crayford and see how things were going there. I feel convinced that my readers will soon have come to the conclusion that the production of high-class machinery, especially of a new type, is not such a simple matter as one might suppose.

When we found that our little factory in Hatton Garden was altogether too small to turn out guns on a commercial scale and to fill the numerous orders that we had on our books, we looked about for a larger place, and finally found a lot of large empty buildings at Crayford, in Kent, which were very suitable for the purpose. There was a large boiler house with two large Lancashire boilers, and the landlord would not allow us to take over the premises unless we purchased the boilers. I looked into the fire-box and saw at once that the boilers had been overheated with little or no water in them; that they were extremely rusty and probably of no value. I agreed to take the boilers on a valuation, but later on, when I was very busy, one of my fellow-directors went down to Crayford, saying that he understood English business much better than I did, and that he would close up the deal and get the lease.

The landlord told him that I had agreed to take the boilers at a valuation, which was very indefinite; would it not be better to state who the valuers should be? He mentioned a firm, and my fellow-director, consenting, signed the

provisional lease, which was afterwards completed by the company.

I insisted that the boilers should be actually tested by the engineers who were to make the valuation. They brought down their gauges and pumping apparatus, and when I attempted to enter the boiler house they said: "No, you must not interfere; it is our business, not yours, to test the boilers"; but I stood in the door while they went on pretending to test the boilers. Of course, as these boilers were of great size, a single stroke of a hand-pump would only make a slight difference in the pressure. It would take many strokes, even after the boiler was full, to show on the gauge, while the individual strokes would not show at all. But when I saw them pumping, I noticed that the gauge moved at every stroke of the pump, and very soon they had apparently tested the boiler at the pressure agreed upon, which I think was 150 lbs. to the square inch.

I saw at once that this was not an actual test. As a matter of fact, these fellows were to receive 5 per cent on the valuation of the boilers for testing them, and they wished to make as high a valuation as possible.

What they had done was to tap the boiler, run a pipe inside, and then return it to the gauge with some small receptacle inside that would really hold a bit of water—a quart or so; and it was this that they pumped up instead of the boiler.

I was too old an engineer to be taken in by such a trick as this. I knew that the boilers would not hold water and ordered them out at once. When they were in the yard I found that close to the rear end where they rested on the brickwork there was nothing but rust, and with the toe of my boot I kicked a hole through the boiler big enough for a cat to pass through; moreover, the fire-box had been

burnt. When I showed this to the landlord he made a compromise.

The valuation of these worthless boilers was £800. I then obtained a valuation from a real engineer, who placed it at £30—just what they were worth for old iron. It is interesting to note that I purchased an excellent pair of new boilers of the same size and kind for £800.

Before the amalgamation with Nordenfeldt, his company had built a rather large and fine works at Erith, and these too were using a large number of American tools. Nordenfeldt was supposed to have charge of the Erith factory, while I had charge of the one at Crayford, and somehow or other I succeeded in purchasing American tools at a price considerably less than that paid by Nordenfeldt.

I had a good deal of experience at Crayford, Bexley Heath, and Baldwyn's Park. The shifting of the factory to Crayford necessitated my giving up the place I had purchased in London and going to Bexley Heath to live. I hired a large house with five acres of land, but before going into the house I had the inside done up. I told the painter that I knew all about painting, was thoroughly well up in the chemistry of it, and wished him to use real paint instead of the bogus imitation. I assured him that the proper materials could be found in England, otherwise it would be impossible to paint a coach ; that the paint on a coach was very hard and not the least sticky, but that I had noticed that the paint used on houses remained soft and sticky. He said he knew all about it and would use the proper material, which would get hard in a few days. I lived there about four years, but not long enough for the paint to get hard.

Previous to moving to Bexley Heath I hired a gardener to put the grounds in order and left him for a week. On my

return I could not see that he had done any work at all, and I was told by one of my neighbours that he had not even pretended to work; however, he demanded his pay. As he was said to be the best gardener about the village, I gave him a good scolding and told him he would be looked after. The next Saturday that I put in an appearance it was not difficult at all to see that he had been doing something. He had cut down a lot of the shrubbery and small trees and had piled them up and burnt them, very much to the damage of the place. When I asked him why he had cut down the laurel trees level with the ground, he said they would grow up again in a few years, and that his object in cutting them down was to make a show, so that I could see that he had been at work.

After we had moved into the house he told us that gravel was required on the paths in the garden and around the house, and he was given permission to order sufficient to make the place look tidy; but for many days the material kept arriving until there was altogether too much of it. We then learned that he was receiving a shilling a load commission. We discharged him and hired another gardener, and there was no more trouble in that direction.

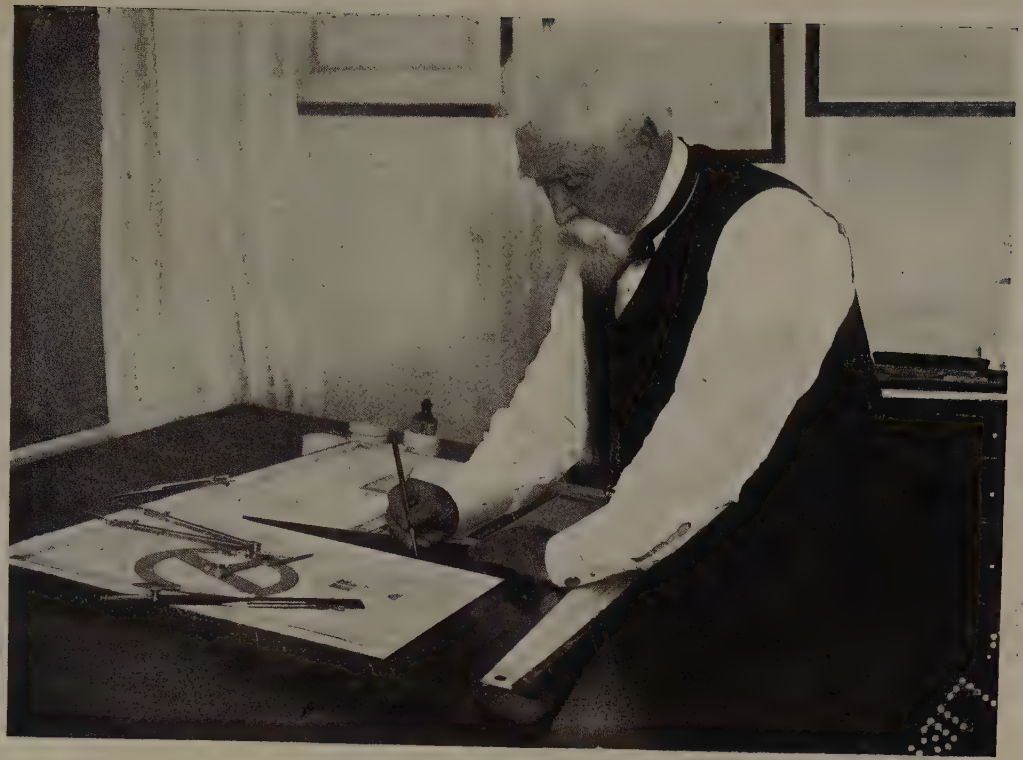
I purchased horses and carriages and hired a coachman and groom. We bought the oats of a local dealer, but Lady Maxim, suspecting that we were being imposed upon, stopped a load of oats in front of the house and asked for the bill. It was presented, and was found to specify the weight of the oats. Lady Maxim ordered them to be brought into the house, where they were weighed on reliable scales and found to be 33 per cent short. It was only too evident that the coachman was receiving a commission. We sent the oats back, but the dealer pretended that there was a mistake; this was altogether "too thin." We then ordered our oats

from the Army and Navy Stores, and they were always full weight. But somehow or other our horses became thinner and thinner. Investigation showed that the coachman had been in the habit of selling about half of the oats. He in his turn was discharged.

We employed a middle-aged woman as cook, and she was always complaining about the kitchen range. Much of our food was smoked and spoiled. We ordered the local range man to examine it and put it right, but still it went wrong. He came several times, and finally, as things got worse instead of better, I brought up a very clever mechanician from the shop, who was able to do all kinds of work. The range was of the very best make, and I saw no reason why this man could not put things right, but he had not been many minutes in the kitchen when the cook commenced to scream. She ran to my wife in a great state of excitement and said that the man had grossly insulted her ; the man of course was turned out. When I asked him about it, he said that the woman put everything in his way to prevent him examining the range, but as he persisted she commenced to scream. The cook in her turn was discharged.

I then called on the range man, and he told me that when he went to examine the range the cook told him that it was all right ; " but," said she, " they've got loads of money, and if you take it out and we get another one my husband can get a big commission on it, and you can sell the old one, which is as good as new."

Shortly after this my wife went to the States for several weeks, and before leaving she engaged another cook. When she returned she was simply amazed at the butcher's bill. She soon learned that the cook had been ordering vastly more meat than was required, some of which she gave away, while some was buried in the garden. The cook told one



MY FAVOURITE OCCUPATION

of the other servants that she was getting 5 per cent commission on all the meat and groceries that she purchased.

While I was living at Crayford I had a call one evening from a very interesting American. He was a handsome man of middle age and a good talker. He told me that coal that would produce fourteen candle-power gas was scarce and dear in London ; there was plenty that would produce twelve and even thirteen candle-power, but that would not do. The City government demanded a fourteen candle-power gas. The gas of from twelve and thirteen candle-power was cheap, and it only required a little to change it to fourteen. Could I not do it ? He had heard from New York that I was the leading expert in such matters. He told me the gas pipes that I would have to deal with were four feet in diameter. I saw at once that only a relatively small quantity of gasoline would raise the twelve and thirteen gas to fourteen, but if a common carburetter were to be used it would have to be as large as St. Paul's Cathedral, so that was out of the question.

While we were at dinner I thought out a totally new form of carburetter, which would be small, cheap, and effective, and which could be used without a four-foot connection. Hurrying through my dinner, I went directly to my drawing table ; I went at the job tooth and nail, and the gentleman left my house before eleven o'clock with a set of well-made coloured drawings. These he had traced, and commenced to make the apparatus at once.

In this new system of carburetting I converted the gasoline into vapour under a pressure of thirty pounds to the square inch. This was allowed to escape through a relatively small jet in a species of injector. It sucked the gas out of the four-foot main through a three-inch pipe, and then forced it back again into the main mixed with the

vapours of gasoline. This extremely rich gas, by entering the main with great force, caused the rich gases to mix at once with the poor gases in the main, and in this way any degree of enrichment could take place and was completely under control. It was adopted and used by several of the largest gas companies in the world, and in a short time caused a famine in the gasoline market.

In the early 'eighties the British Government was having a lot of trouble with the Arabs of the Soudan. Like their early ancestors the Saracens, these half-savage tribes were very fierce and warlike, and on many occasions the British troops received a check. At that time the Gardner gun was in the service, and whenever they had occasion to use it the man turning the crank got excited and turned the crank so fast that the cartridges did not have time to fall into position, whereupon the gun jammed and the brave detachment became the victims of the sharp swords of the Arabs. This was repeated several times at different dates, and finally the Gardner guns were displaced by the Maxim. At the last, and by far the greatest battle of all, Omdurman, there was no jamming, and the newspaper reports stated that as the Maxim gun was turned round over the plain "a visible wave of death swept over the advancing host." The Arabs were defeated and the war ended. Sir Edward Arnold, in writing of this battle, said: "In most of our wars it has been the dash, the skill, and the bravery of our officers and men that have won the day, but in this case the battle was won by a quiet scientific gentleman living down in Kent."

And even the German Emperor said practically the same thing.

A great deal was said in the English Press about the terrible slaughter of Arabs due to the Maxim gun, but those

who might have imagined that the writers had rather overdrawn it should have seen the American papers. At that time I had a kind of a double in America, who was rather a florid writer, and as he was masquerading as Maxim, the gun inventor, it may be imagined that the accounts he wrote of " the terrible wave of death that swept over the advancing host " were lurid in the extreme ; in fact, the English accounts were not in it.

CHAPTER XXII

IN the winter of 1884–5 there was a good deal of dis cussion among naval officers and others regarding th efficiency of the Whitehead torpedoes. It was claime by many that it would be very difficult to hit a ship even a short range if the ship were in motion at the time. Whil this discussion was at its height, Bryce Douglas, a ver clever and well-known Scotch engineer, came to see my gu at Hatton Garden. The very fact that I had made a gu that would load and fire itself more than ten times in second seemed to make him believe that I might be of som use in other directions. He told me that he did not believ the Whitehead torpedo would be of any use in the Navy He expressed the opinion that when both ships were i motion, in a fleet action, or perhaps in a rough sea, th Whitehead torpedo would be quite as dangerous to a frien as to a foe. He was in favour of increasing the size of th torpedo and of propelling it through the air instead o through the water. He believed that if a large torpedo wer exploded within a few feet of the hull of a ship it would ope a large hole which would let in more water than could b dealt with ; and he asked me if I could produce a gun o very large bore for throwing aerial torpedoes.

I told him that I could, and when I brought the matte before my fellow-directors it was agreed that I should desig such a gun. I commenced at once to make the drawings being fully engaged in the daytime, I made them in th evenings.

Before that time a good many artillerists had been racking their brains with a view to finding some kind of fuse that would not go off *instantly* when the projectile struck the ship. They wanted a delayed action, even if it were not more than a thousandth part of a second ; but somehow no one tumbled on to the right system. However, it seemed very simple to me ; I certainly must have a delayed action fuse, for it would not do for the big torpedo to explode until it had gone some distance into the water. This I accomplished by placing the firing-pin a considerable distance from the primer instead of in close proximity as in all other fuses. This system, being a complete solution of the long-vexed question, is now used everywhere and has been repatented by others.

Having designed the gun, I took the drawings up to Glasgow, where Bryce Douglas was employed as Chief Engineer at the Fairfield Shipbuilding Works. My drawings being approved of, Bryce Douglas made a model of the gun, four-inch bore and about twelve feet long. At the same time I visited the works of Nobel with a view to arranging for the manufacture of the explosives to be used in connection with the big gun.

On my return to London I received a visit from the American Naval Attaché. He was very strongly in favour of the new system of throwing torpedoes, and, thus encouraged, I had further discussions with the Fairfield Shipbuilding Company, who designed a very fast cruiser to be armed with one of these guns.

At first we thought of making the gun with a bore of twenty inches, but later on we decided to make it twenty-six inches. It is needless to say that a torpedo of this diameter and eight feet long would hold a lot of high explosives, and on going off would produce something like an earthquake.

It was believed that such a torpedo exploding eight or ten feet below the surface, even if twenty feet away from the ship, would rupture the hull sufficiently to sink the ship.

The big gun was provided with what is known as a sub-calibre powder chamber, that is, the powder chamber was nothing like as large as the bore of the gun. The design allowed a lot of space between the projectile and the powder charge, the powder being loaded into a steel tube about a quarter the diameter of the bore of the gun. The powder was to be of different degrees of burning and to be compressed into the tube: a very slow-burning variety would be ignited at first, while the quick powder would be the last to go off. In this way very little shock would be communicated to the torpedo.

But as some of the wise (?) ones were of the opinion that no Government would ever consent to the throwing of high explosives with a powder charge, I also designed an air-gun which was much more efficient than any other air-gun that had ever been made.

The true theory and law regarding the action of air-guns had not been understood by most engineers. They imagined, for example, that if the pressure in an air-gun were doubled, the energy in the projectile would also be doubled, but this was very wide of the truth. To double the pressure it is necessary to double the weight of the air, so that it is highly doubtful if we should get a higher velocity of discharge of air through a tube at 400 lbs. to the square inch than we get at 200 lbs. With 400 lbs. pressure there would be twice the energy, but it would be opposed by twice the weight of air.

Understanding this law, I constructed an air-gun on a new plan. First, I charged my reservoir with air impregnated with gasoline sufficiently to make it explosive at 800 lbs

pressure to the square inch, and had a very effective balanced valve that opened suddenly. On the opening of the valve the projectile was urged forward with a force due to the air pressure, but when it had travelled about two feet up the bore of the gun, the passage of the projectile uncovered a tube and drove a small cartridge against a firing-pin, the cartridge being charged with gunpowder and pulverized magnesium. This, of course, ignited the explosive air, whereupon the pressure suddenly mounted to more than 3000 lbs. per square inch. The air pressure was therefore greatly increased while its weight remained constant. This was very effective and gave to the projectile a much higher velocity than had ever been obtained before from an air-gun.

In firing the model gun with a four-inch bore near a large building, the report was so sharp that it broke the glass in the windows exactly as black powder would have done.

When everything was ready, a beautiful drawing of the ship armed with the gun was submitted to the American Naval Attaché and then sent to the Secretary of the Navy, Washington, D.C. It may be imagined that the specification which I sent out with this gun made out a strong case in favour of aerial torpedoes, instead of submarine. But it was altogether too new, too drastic a change, and the Navy Department declined to allow us to build them a cruiser under the plan laid down in my drawings and specifications, or to build one themselves.

The big powder gun, with its projectile and delayed action fuse, were patented by me in England on 30 May, 1885, the number of the patent being 6591.

As the English Admiralty seemed satisfied with the Whitehead torpedo, and as the American Navy declined

to have anything to do with my big gun for throwing aerial torpedoes, the whole matter was hung up for several years. However, about ten or twelve years later, at the time of the breaking out of the Spanish-American war, I was somewhat surprised to receive another communication from the Secretary of the American Navy, again declining to have anything to do with my gun or cruiser. The letter was addressed to "Hiram S. Maxim, Esq., 32 Victoria Street, London." It referred to a letter of recent date that I was supposed to have written renewing my offer. It appeared to me that someone had been writing from London without my authority.

Shortly after this the Spanish war broke out, and it was reported in nearly all of the American newspapers that "Mr. Hiram Maxim, of gunmaking fame, London, had offered to build for the U.S. Navy a small cruiser, and to arm it with one large gun that was *fifty thousand times as effective as any other gun*, one of which would wipe out the whole Spanish fleet at a distance of nine miles." As I was the only Maxim in the world that had ever invented, patented, or made a gun of any kind, there could not be the least particle of doubt that I must be the party referred to.

Some little while after this notice of my great liberality had appeared in the American papers, I was aroused from my sleep at two o'clock one morning by a violent rapping and ringing at my door. Slipping into my dressing-gown as rapidly as possible, I managed to get to the door ahead of my manservant. I found, much to my surprise, one of my fellow directors in a high state of excitement.

"Maxim," he said, "what in the world have you been doing? It is all right and highly commendable for a man to be very patriotic and do all he can for his country, but

you are one of the directors of an English company ; we are neutral ; we cannot take sides."

Upon asking him what had happened, he told me that he had just received a telegram from Spain stating that there was great excitement there and our factory was liable to be destroyed at any moment on account of the offer that Hiram Maxim had made to the American Government—namely, to supply them with a cruiser armed with a gun of extraordinary power that would wipe out the whole Spanish Navy at a distance of nine miles.

I assured my fellow director that I had made no such offer ; that the only offer I had ever made to America was many years before when that country was at peace with the whole world. However, we dispatched a telegram assuring the Spaniards that neither Hiram Maxim nor any of his fellow directors had anything to do with what had appeared in the American papers, and that no such gun was in existence. This satisfied the Spaniards and our works were not interfered with, but the extraordinary statement gave us a lot of trouble from other sources. Of course it led to much ridicule, and we received letters and telegrams from all over the world.

In order to combat this annoyance we put a notice in the newspapers to the effect that we had never made any such ridiculous claims, and that the reports had probably emanated from someone who had never made a gun in his life.

Shortly after this I saw by the London papers that it was announced in the American Press that I had taken a certain ship for New York and would arrive on a certain date. To the best of my knowledge and belief I was still in England. About a week later it appears that I arrived in New York and was received by about forty newspaper reporters, to whom I gave plenty of copy and all the particulars about my

big gun which was "*fifty thousand times as effective as any other gun.*"

I obtained copies of some of the newspapers that contained accounts of this wonderful gun and of the great success I had met with in England. The *New York Herald* had a very large coloured engraving showing a gun having a bore of about ten feet and a length of about half a mile—that is, the gun was about the size of the Brooklyn Bridge—and it was claimed that one of these guns would protect New York from the navies of the world. It was described in the newspapers as "THE MAXIM GUN FOR THROWING AERIAL TORPEDOES," and as I was the only man in the world by the name of *Maxim* who had ever made a gun, or taken out a patent on a gun, of course there could be no mistake about it.

Mr. Henry Clair, who had charge of one of A. T. Stewart's hotels, told me that on one occasion a group of about a dozen men, mostly newspaper reporters, were interviewing a man at the hotel. One of Clair's assistants said, "That is Maxim, the great gun inventor from London." Clair approached the party and asked:

"Are you Maxim, the great London gunmaker?"

He replied that he was.

"That is very curious," said Clair; "I count Hiram Maxim among my greatest friends; he is about twice your size and a d—— sight better-looking."

Only a few weeks ago a gentleman called to see me at my office in London. On leaving, he remarked to my secretary that I had greatly improved since he last saw me. I had a much better colour, held myself more erect, and seemed to be considerably taller than when he had seen me in Chicago, whereupon my secretary told him that I had never been in Chicago.

I often see in the newspapers that I am lecturing on high explosives in the States, that I am bragging about my guns, that I am burning nitro-glycerine in a lamp or doing some other foolish trick, when I know all the time that I am in Europe.

It may be laughably funny to have a double—but I find it a decided nuisance.

As may be imagined, there was a good deal of uncertainty about my identity, and eventually an American journalist came out from New York with the avowed purpose of proving that the London Maxim was the bogus edition. He wrote me that "facts were very stubborn things to deal with," and that he proposed to show me up in my true colours.

In my reply I told him that I agreed with him in regard to the difficulty of dealing with facts. I then gave him a list of my patents, showing that I was the first to patent an automatic gun, that I was the first to combine nitro-glycerine and gun-cotton in a smokeless powder, that I was the first to design and patent a delayed action fuse, that I designed and patented the large guns for throwing aerial torpedoes, that these patents were undoubtedly ahead of all others, and I advised him strongly, before he commenced to annihilate me, to make a search at the Patent Office, when he would find that I was the only Maxim that had ever patented a gun, and that if he wished to go a little further he would find that I was the only Maxim who had ever made a gun.

I think this gentleman took my advice, because he made no attempt to annihilate me as he had threatened; and I would invite all those who attempt to dispute what I have written in this volume to follow the advice I gave to this writer.

At the time these extremely misleading tales were being

circulated in America, I engaged an expert to examine the English and American patents, and he reported that no gun patent could be found in the name of any Maxim except that of Hiram Stevens Maxim, which happens to be my full name.

I learned from my brother Samuel who lives at Wayne, Maine, that my aged mother had expressed a wish to see "her Hiram"; she was satisfied that she could not last much longer and she wanted to see Hiram, whom she had always referred to as "a very good boy," before she died.

In company with my wife, I took the steamship for New York, but I had not been there very long when I learned that I was supposed to be getting up a Maxim Gun Company in that city. I discovered that Judge Diffendorfer was to be the president of my new gun company, that it had been represented that I had made a lot of money in Europe, and was now going to allow my friends in the States to make some money out of my gun invention. This was certainly amazing. I positively had no right to organize a gun company in New York without the consent of my fellow directors. Only a short time had elapsed when I received an ultimatum which I was asked to sign. This was an agreement on my part that I would not put in a disclaimer, stating that I had nothing to do with the "Maxim Gun Company of New York." The ultimatum also demanded that in the event of my fellow directors in London repudiating the new company, I would come out in the teeth of them and endorse it, stating that it was all right; otherwise my "mother's grey hairs would be brought down to her grave in sorrow."

The Maxim gun patents were of enormous value. When Herr Krupp saw the gun fired in England, he said to me: "I do not believe any of your associates appreciate the great value of that invention." When, however, the

Maxim-Nordenfeldt Company was formed the Maxim gun patents for the world were put in at £900,000, and the shares were subscribed for many times over in a few hours. It will therefore be seen that as I had disposed of my patents and received my pay for them, it was certainly very difficult for me to authorize the bringing out of another Maxim Gun Company in New York.

If anyone feels called upon to criticize what I have written, I beg him to consider the following points, and ascertain how they can be explained away. There certainly was a very strong attempt made to bring out a Maxim Gun Company in New York. No one will dispute that the newspapers were full of illustrations and descriptions of "A Maxim Gun," and if they will take the trouble to search the patent offices they will find that at that time I was the only man in the world by the name of Maxim who had patented a gun; not only this, but I was the only Maxim who had ever made a gun. My gun was an absolutely new departure, quite different from all other guns, and was always known as "*The* Maxim Gun."

Of course it was impossible for me to be bullied into such an arrangement as the ultimatum demanded, and the Maxim Gun Company of New York was not brought out as the promoters had expected.

CHAPTER XXIII

ALTHOUGH I have been swindled and cheated almost an infinite number of times, it is safe to say that I do not enjoy it. I do not like to be taken in.

Lady Maxim, having discovered a first-class American dentist, who was quite able to take care of her teeth and prevent her from losing any of them, recommended him to others. Ultimately he came round to our house at Queen's Gate Place, and I found him to be a very charming and interesting young man. Shortly after this he told my wife that he had become engaged to a young lady who was sole heiress to a large fortune, but it was necessary for him to keep up an appearance in order that everything should go through without a hitch. He wanted to borrow £240 to enable him to carry through the affair in style and make a good impression. For security he would offer me some very elegant furniture, and also the goodwill of his business. I went up to his surgery and found that he had some of the very finest carved Venetian cabinets and bookcases. I saw that they were well worth the money, so he gave me a chattel mortgage on all the furniture in the place, including a very elaborate and expensive American dentist's chair. I thought I was well secured. The next thing that I heard of him was that he had gone off to Paris with a chorus girl from one of the theatres, whom he was passing off as his wife, and that my £240 was paying for this little outing. When I went to see what could be done about the furniture I found

that another man had a chattel mortgage on it prior to mine. Worse still, I learned that he had obtained the furniture on the hire system and had never paid for it.

Shortly after I had purchased Thurlow Park, as it was called, at West Norwood, where we had very large grounds, my wife became much interested in chickens. We had various breeds—among others some prize bantams which we had purchased at the Crystal Palace Show; and the next year we reared a lot ourselves. They were of the black-breasted red game variety, their ancestor being no less than Lord Chesterfield![1] When it became necessary for us to go to Bexley Heath to live, we hired a large van, put our chickens into it, and they were duly installed in a barn on the premises, about two hundred yards from the house. Next morning, when we went to see how our little pets were getting on, we found them all dead and covered with meal. We also found that a meal bag had been emptied on to the floor, and that the chickens had probably been put into the meal bag. We next discovered that about twenty of our large fowls were missing. Evidently the thieves first found the bantams, after killing and "bagging" which they discovered that there were also large fowls on the premises, so they emptied the bantams on to the floor and filled up the bags with the large fowls.

We then learned that there were more chicken thieves to the square inch in and about Crayford than in any other part of the known world. One day, as I was passing through the station, I saw a little pamphlet entitled *How to Keep Chickens*, which I bought and read, but the system recommended didn't work; the only way to keep fowls in that part of Kent was to put them in the safe!

My gatekeeper had a hen that was a celebrated setter.

[1] In this case his lordship was a bantam rooster.

She was always successful—a phenomenally large and fine hen, and a good mother. I hired this fowl when she wanted to set, and we put fourteen eggs from our largest and best hens under her. Curiously enough, every one of them hatched, and what is still more remarkable and almost incredible, every one of them was a rooster.[1] It was not long before they were very much larger than their mother, but still she did not give them up. One night they all disappeared—the professional chicken thief had annexed them.

I think as a general rule we are proudest of the powers that we possess in the highest degree. Very early in life I discovered that I was very much stronger than other boys of my age, and that in wrestling I could throw everyone except the big boys.

At the grist mill the farmers generally brought their grain to be ground in two-bushel bags. Almost anyone could shoulder two bushels of oats; about half mankind could shoulder two bushels of barley; and only about one in twenty two bushels of wheat. My father would toss any of them on to his shoulder as though they were bags filled with feathers instead of grain. I commenced young and kept at it, and before I was a very big boy I could seize a bag of wheat, throw it on to my shoulder, and walk into the mill with it. Sometimes when an old farmer came, and very laboriously got his bags of wheat off his sled or wagon, I would walk out very unconcernedly, and, just as he was looking, would take hold of a bag of wheat, throw it on to my shoulder, and walk off. I was gratified because the old fellow was astonished.

When I was about eighteen there was a contest of lifting weights at Abbott Lower Village. Everybody within miles

[1] The mathematical chance of their all being roosters was 1 in 16,384.

had a try, and I beat the whole crowd except one, who was two years older than myself, and a wonderfully big and strong boy; but he only lifted twenty-five pounds more than I did. My father was very proud of what I had done, and that night he rubbed me down with strong New England rum to keep my muscles from being inflamed.

I kept up this trial of strength for many years. On a certain occasion a rather light German, weighing not more than one hundred and twenty pounds, was bragging about his strength in a most extravagant fashion. I asked him if he considered himself stronger than a man of my size, and he said, "Certainly." I said nothing, but at noon that day, when we left the works, I went up behind him, picked him up in my hands, and balanced him on the top of my head. I asked him if he would do the same to me, but in vain.

At Crayford there was a part of a gas machine which I think weighed some fifty odd pounds. I took it up in my right hand, held it at arm's length, then let it down a few inches and raised it up again, five or six times, very much to the astonishment of the coppersmith. About a fortnight later, while passing the shop, he asked me if I would step in. He said: "I have had a lively dispute—the men won't believe a word I say. I told them that you had lifted that thing at arm's end, brought it up about level, down again, and up again several times. They have all had a try, and there's no one that can get it up even once, and they don't believe that anyone else can do it."

He asked me if I would mind doing it again. I said, "Certainly." But he wanted some witnesses, so he ran out and brought in four, and I performed the feat, very much to their astonishment, and they all wrote their names down as witnesses.

At that time we had in our employ a blacksmith's hammer-

man. He was about six feet three inches and very large and strong. He was the man whom I selected to go with the paymaster to the bank for the money to pay the men. One day, being a little boozed, he came into the office and persisted in talking with the book-keeper. When I ordered him to go about his business he refused to go. I said to him: "I am the managing director, my orders must be obeyed; when I tell you to do a thing, you must certainly do it." Still he hesitated. Anyone else would have sent for a policeman to put him out, but I did nothing of the kind; I grabbed the fellow up, threw him out of the door, and down about five or six steps on to the bottom. He fell face downward, and as he struck, everything he had in his pockets fell out. The gateman, who happened to be passing, said the fellow came out exactly as though he had jumped off an express train going at full speed. After that my orders were never disobeyed.

CHAPTER XXIV

WE in England are in the habit of saying that nothing less than a surgical operation will get a joke into a Scotchman's head, but the story that I am about to relate puts the boot on the other foot, because the stupidity shown by certain Englishmen throws completely into the shade anything that ever happened in Scotland or to the Scotch.

There was a very clever barman at Hoboken, New Jersey, just across the river from New York. He was a German, and the fluid that he dealt in was lager beer. There was a large garden in the rear of the premises, with a shooting gallery, and he soon became a very expert shot with the rifle at short range. Having been in the States a great number of years he spoke English as well as the best of us. He read in the newspapers that a certain Herr Doewe, a German tailor, had invented a bullet-proof cuirass—that is, a species of jacket one could put on which would resist the projectiles of all military rifles.

He went to Germany, where he found that a simple tailor, who knew considerably less than nothing about gunnery and dynamics, had really been experimenting and spending his money in attempting to make some arrangement of cloth, canvas, buckram, and so forth, that would stop the infantry projectile ; but no matter how thick his material was, the bullet passed through as easily as it would have done through a piece of thin lace. But the very idea of

stopping a projectile by some sort of a garment was popular ; it was taken up and discussed all over Europe and America ; and the majority of military men thought " there might be something in it."

As this idea had been so broadly advertised, our German-American thought it certainly ought to be worth something, so he entered into an arrangement with Herr Doewe, and very soon had the exact apparatus that was required, which was not a cuirass, however, but a shield. He brought it to England, and it was advertised in the papers that Herr Doewe, the scientific tailor, had brought his cuirass to England, where it could be tried ; it was announced that the first trials would take place at the Alhambra Theatre.

In the meantime the German-American had become metamorphosed into a United States Army officer, by the name of Captain Leon Martin. This bar-keeper captain and Herr Doewe appeared on the stage, when a military rifle with standard ammunition was produced, and while Herr Doewe stood with the shield, which was about sixteen inches wide and twenty inches high, on his breast, Captain Leon Martin, using a rifle which had been loaded by a military officer, fired, making a target on the breast of Herr Doewe ; both became the talk of the town.

Here we had a German tailor, with a thin flexible shield on his breast, that would resist the powerful blow delivered by a small-bore military rifle. It was a nine days' wonder. On some occasions several shots were fired, and as Herr Doewe marched off the stage, deformed military projectiles would apparently drop out of the shield on to the floor.

On one occasion Captain Dutton Hunt, of Her Majesty's service, loaded and fired the rifle himself, with the same result. Captain Leon Martin and the little tailor gave an exhibition before His Royal Highness the Duke of Cam-

bridge, and also showed their apparatus to Royalty at St. James' Palace.

The celebrated rifle shot, Mr. Frederick Lowe, was very greatly interested, and on one of the many occasions when he took his position as an expert on the stage he picked up one of these deformed projectiles and found it was quite hot. He was convinced. He put it in his pocket and came to see me. I saw at once that the projectile had been "mushroomed," as they call it; that is, it had been fired into soft earth, at short range, and had been heated for the purpose of deceiving.

A few days later my friend, Mr. Lowe, came to see me again, bringing a piece of paper of the same width as the shield, but a little longer. This had a bull's-eye upon it; the extra length having been doubled over at the top of the shield to prevent it from falling off. After the firing this piece of paper had been passed round for interested parties to examine. The bullets had passed through near the centre, and the fold, which had been made at the top to hold the paper on to the shield, was rather sharp. This bend was about three inches from the edge. On examining this paper closely I found several little slits, two and a half inches from the bend. I saw at once that these slits had been cut by the splash of the bullet striking on hardened steel, two and a half inches from the face of the shield. I knew at the time that the splash of a bullet would always indicate the kind of material that it struck, and that nothing but a piece of very hard steel would send the splash off perpendicularly to the path of the bullet. Every other substance yields under the blow, and the indentation made sends off the splash at different angles. For instance, with a piece of copper the splash would be about forty-five degrees off the perpendicular, and a piece of heavy rolled

zinc practically throws the splash into the face of the gunner.

Having thus ascertained that the shield, which had caused so much excitement in London and had brought a crowded house every night to the Alhambra, was a fraud of the first water—that is, nothing more nor less than a piece of very hard steel armour-plate in a cushion—I at once sent a series of letters to the London Press, stating that I, an old gun-maker, was intensely jealous of Herr Doewe, and that it was very humiliating for us to be beaten in anything relating to gunnery by a German tailor. I therefore had taken up the subject myself, and after experimenting continuously for fifteen minutes, I had discovered a *shield* which was very much lighter than Herr Doewe's, but equally effective; and I asked the newspaper men to come down to Erith on a certain date to see the experiments. The letter was all right, but the newspaper men in various editorials and notices made it conform to what was originally said of the shield while it was in Germany—that is, they described it as a *bullet-proof jacket.*

On the day of my exhibition an immense crowd appeared at the London stations; extra trains had to be put on, but as all of these were filled many took the train to Crayford or Bexley and walked across country. At any rate, we had an immense mob on the premises. I had made a kind of scarecrow, which was labelled "Herr Schneider," with my shield on its breast. I showed that I could fire at it with impunity, without one of the bullets passing through the light shield. But Captain Dutton Hunt was not so fair to me as he had been with Herr Doewe, as in my case he insisted on investigating the shield, and being a large and strong man he had his way. He found that it contained the piece of steel, which was really an extremely fine piece of nickel

steel, one-eighth of an inch thinner than the steel used by Herr Doewe, and therefore much lighter.

Captain Dutton Hunt did not see the joke. He said that they had been imposed upon, and that the whole thing was a fraud, in which charge the newspaper men all joined him. I attempted to tell them that the only difference was that I was using a thinner piece of steel than Herr Doewe, that Herr Doewe depended upon steel, and I depended upon the same thing; in fact, that steel was the only thing that would stop the bullet without being extremely heavy. However, all the newspaper men went off to London in a huff, and that evening and the next day it may be imagined that no man in England ever received such a severe slating as I did. It was something dreadful. I wrote to nearly all the papers the following day, pointing out that my shield was certainly better than the tailor's, because it weighed less, and was quite as effective.

Two days later a large number of journalists in London got together and collectively sent me an invitation to dinner, and when I arrived they said: "Maxim, you are the only sensible man we have among us." They could hardly understand why it was that they had not seen the joke.

Needless to say, after that Herr Doewe's bullet-proof cuirass did not meet with any success; but in the meantime he and his confederate had made a lot of money out of it.

I have never been able to understand why it was that Captain Dutton Hunt did not put in an appearance at the dinner which was given to me by the Pressmen of London.

The steel that I used was an extraordinarily fine specimen of nickel steel that had been sent to me to test, and was just strong enough to stop the military projectile safely. Herr Doewe's shield was of chrome steel.

CHAPTER XXV

I PLEAD guilty to being a chronic inventor. I commenced while I was very young and have kept it up ever since; but all of my experiments have not succeeded, as will be seen from the following, which I think will interest some of my scientific friends, as they may find some phenomena which were completely unknown to them before.

While living in New York I was walking down Dey Street from Broadway one morning, when the wind was blowing up the street at a velocity of about fifteen miles per hour. As soon as I turned into the street I noticed a very strong smell of coffee. The street was about sixty feet wide, the smell was equally strong on both sides, and I imagined that if I had ascended sixty feet I should have found that the smell was the same. I then computed roughly in my mind how many cubic feet of air were passing per minute, and how much coffee it would take to produce it—apparently nothing less than a shipload.

When I got to the bottom of Dey Street I found a coffee-roasting establishment, where they had about one hundred and fifty pounds of coffee in a rotating cylinder over a charcoal fire.

That night I read everything I had in my little library connected with coffee, and the next day I bought several books. I found that the Dutch used more coffee per head than any other people in the world, but that the Americans,

although using less per head, used as much coffee as all the world besides.

By a still further study of the subject, I learned that fully half of the valuable properties of the coffee went off in the roasting, and it appeared to me that these waste aromas, if they could be captured, might be of more value than those that remained in the coffee after the roasting. But I was so busy in America that it was not until after I had been a long time in France and Belgium, and had come to England and was getting on well with my experiments with an automatic gun, that I again took up the subject of coffee.

I found still more literature on the subject, and learned definitely that more than half, and that the best half, of the properties of coffee passed off into the air in the roasting process. At a neighbouring engineering works I obtained a piece of thick lap-welded wrought-iron pipe, with an internal diameter of three inches. Each end was threaded, and a very strong wrought-iron cap ground on, with just a trace of red lead in the joint. One cap was drilled and tapped to fit a one-inch steam plug, and the other for a three-eighth-inch pipe. I had this mounted on a little stand over a perforated gas tube, which produced a flame very nearly the entire length of the cylinder.

As my time was fully taken up with gunmaking, I took my apparatus home to experiment on it in the evening, with my wife as an assistant. I obtained a pressure gauge, of moderate size, that registered up to 800 lbs. per square inch. It was my idea first to ascertain how much heating and roasting was required in order to drive the water out of coffee and peas, and then to find how much heat it required to roast the coffee after it had been deprived of the greater part of its water. When these experiments were finished

and I knew definitely how much gas to turn on and how long to allow it to burn, I placed about a pint of coffee and a pint of common dried peas in the cylinder ; this I rotated over the fire, the gauge revolving with the cylinder, and the steam escaping until I was satisfied that the greater part of the water had been driven out. I then closed up the outlet and continued to rotate the cylinder over the gas fire for some minutes, when I noticed that the pressure was going up. I had previously ascertained that the temperature which produced the best results in coffee was equal to the temperature of steam at 250 lbs. to the square inch, so I continued to rotate the cylinder over the fire, and when I had done this for about the same length of time that it took to roast coffee according to my previous experiment, the pressure had mounted to just 250 lbs. to the square inch. I was satisfied that both the peas and the coffee were properly roasted, that none of the valuable aroma had escaped, and that if I allowed the cylinder to cool down the aroma that would otherwise have escaped would be taken up by the peas. Sure enough, no sooner did I shut off the fire than the pressure commenced to go down. I watched it with great care, my wife, who is always very much interested in my work, standing by my side ; but when the pressure got down to 180 lbs. to the square inch it stopped. The pointer on the gauge remained stationary for some minutes, and then it commenced to go up again. The fire had been off some time. The pressure mounted slowly at first, until it reached about 200 lbs. to the square inch, when it commenced to go up very fast indeed, actually running past the 800 lbs. mark, the pointer resting against the pin.

I told my wife to leave the room at once, but she wished to argue the question a bit, so I picked her up and put her

out of the room, shutting the door. I then went back and commenced to pour cold water on to the cylinder. If anybody was to be killed, certainly it ought to be myself, not my wife ; if we both remained, both of us might have our heads blown off.

After I had applied water for some time the pressure actually went down to about 500 lbs. to the square inch, and I left it until the next evening, when I found that the pressure had gone down to exactly 250 lbs. to the square inch, and, of course, the thing was dead cold. I expected, when I opened it, to find some perfectly roasted peas and coffee, and that the aroma would be equally distributed through both the peas and the coffee. Imagine my surprise, however, when I took out the inch plug and found that the greater part of the contents was a dark, nearly black, treacle-like liquid with a strong smell of assafoetida. On removing the entire contents I found that it resembled very dark-coloured toffee, with a thin dark-coloured treacle. The question is, where did the water come from ? This is the puzzle that I should like to have some of my scientific friends explain.

It was only too evident that this system of saving the aroma would not do, so I put my apparatus aside for about two or three years, working very hard on the gun in the meantime ; but after a long trip on the Continent, during which I had time to study the subject, I resolved to make a few more experiments. So I obtained two light steel cylinders of about the same size and length as the wrought-iron cylinder I had previously used, and connected the two together with a pipe, with every sort of apparatus for measuring the quantity of gas consumed, the time that the heat was applied, etc. ; in fact, everything was arranged in a thoroughly scientific manner, so that I could have

complete control of the heat and know what was taking place.

I commenced by roasting a pound of wheat. That is, I heated it in the revolving cylinder over a gas fire until the steam had ceased to escape. I then allowed it to cool down, and weighed the wheat, which of course was not roasted after the manner of the coffee, but only heated enough to get rid of the water. I found exactly how much water had been driven out, and this was the datum that I had to go by. I made some experiments with coffee, finding out how much water was discharged before the roasting commenced. I then took a new batch of wheat, put it into the steel cylinder, and rotated it for the same time, passing the vapour through a condenser and weighing the water. I then subjected it to a roasting process, just what I had found necessary to make wheat suitable for mixing with coffee. I then connected it with a vacuum, withdrawing all of the gases, and put the cylinder aside, hermetically closed at both ends. I knew then, of course, that the wheat was in a highly receptive condition.

I next placed a pint of raw coffee in the other cylinder, deprived it of its water, as I had done before, and then connected the two cylinders so that they both revolved together, the one holding the wheat being, of course, cold. I applied heat to the cylinder holding the coffee, just long enough to roast the coffee, and allowed the two to cool down together ; the next day I unscrewed the cylinder containing the wheat, and found, sure enough, that a large amount of the valuable aroma of the coffee that is always lost in the roasting had been seized on and imprisoned in the wheat.

I made some of this into coffee, and experts told me that it was altogether the best coffee that they had ever tasted. This was exactly what I had every reason to expect.

I increased the quantity operated upon until I had quite a lot of it. I ground some of it and put it in a tin can that was supposed to close up airtight, and took it to my house, placing it in my own bedroom. The can was singing all night long and giving off a very strong smell of coffee.

I was then living in London, and the next morning I went to my experimental laboratory, which was at Norwood, and prepared a lot more. I took in some very fine thick and heavy glass bottles, made in Germany, with very large hollow stoppers ground in : each one would hold about three pints. Putting a little vaseline on the ground surfaces, I filled these with ground wheat and coffee and set them aside. But the next morning, when I went in, all the glass stoppers had been blown out, some being on the floor, while others had only been lifted and had fallen back again.

I prepared a new lot, and this time I fastened the stoppers in so that they could not be blown out. The next morning I found that all the bottles had exploded during the night. However, when the wheat was freshly ground after roasting, everyone said it was the finest coffee that had ever been made. I know nothing of the taste of coffee myself, but I had experts to test it.

While conducting these experiments it occurred to me that very few people knew much about coffee. One Sunday I brought out from the Maxim Lamp Works about thirty young men and women. My shorthand writer and typist was also present ; she was one of those young ladies that know all—beyond whom there is no appeal ! I had cleared off a long bench, and arranged a large number of cups, much coffee, plenty of apparatus for making coffee, milk, sugar, cream, and in fact everything. I obtained from the Army and Navy Stores various kinds of coffee which were supposed

to be the very best in the world, such as Mocha, Java, and so forth, and I also obtained from a dealer in coffee some of the siftings and sweepings of his shop, small, imperfect and broken kernels. These I freed from dust and dirt, roasted and ground, and, mixing them with three times their weight of chicory, I was ready for the test. My shorthand writer came in, tasted the Mocha, the Java, the Costa Rica, and pronounced them all very bad. She then tried some of my wheat coffee, and some of that which was half wheat and half coffee, which was also bad, but not quite so bad as the others. But when she reached the mixture of siftings and chicory she was delighted. She said: "That *is* coffee—that's it—that's the right stuff!" In all probability this young lady had never tasted a cup of genuine coffee in her life until that Sunday morning.

The others had various opinions, but there was one gentleman in the company who was really an expert, and he pronounced the mixture of wheat and coffee to be the very best that he had ever tasted.

About this time I was cycling with my wife one Sunday up the Thames when I ran across a celebrated engineer, who, like my typist, knew everything. He said he had heard that I was foolishly experimenting on coffee, which was absolutely of no use. I inferred from his talk that he had no idea what I was doing, but imagined that I was attempting to find a substitute for coffee, something that had no coffee in it at all! He expressed a wish to try some of it, so on my return I ordered from the Army and Navy Stores a one-pound tin of freshly roasted coffee, the very best they had, this being half Mocha and half Java. The coffee was freshly ground the day it was sent to me. I re-labelled the tin and sent it to my friend the engineer. He tried it, and so did his three daughters—in fact, the whole

family tried it; and they pronounced it the worst drink that they had ever tasted in their lives, asserting that it had not the least resemblance to coffee either by smell or taste! So I took another trip up the Thames, had lunch with my old friend, and was ridiculed on account of my foolishness in attempting to find a substitute for coffee. Now, if I really wanted to know what good coffee was, what it ought to be, they had some which they would like me to try. My wife was with me, and she pronounced the coffee to be excellent. We then asked them where they got it, and they gave us the card of the local dealer.

As soon as I arrived home I sent to the dealer referred to for a one-pound tin of ground coffee, such as he had been selling to my friend the engineer, but I did not wish him to mention to anyone that I was buying coffee at his place. This arrived in due time, was relabelled and sent to my friend with the request that he would try my very latest attempt, which I hoped would be better than the first specimen submitted. He tried it: his wife tried it: his three daughters tried it: the family doctor tried it: and then they each wrote down on a piece of paper what they thought of my coffee substitute. One of the girls said it tasted of mice! They all agreed that it had no resemblance at all to real coffee, and advised me to drop the whole thing.

In the meantime an old lady, a neighbour of ours, having heard that I was working on coffee substitute, expressed her disgust, and said she would like to see some of it. Again I applied to the Army and Navy Stores, and obtained a pound of the very best in the world. Having tried it, she reported that it did not have the least resemblance to coffee, being the worst substitute for coffee that she had ever seen.

Although I had succeeded in saving the aroma, and making a few cups of the best coffee ever made on this planet, I could not at the time think of any way to use it commercially. It would have to be handled like soda-water, under pressure, which was out of the question. But later on I found a way to imprison the aroma which otherwise escapes, so that it could be used as coffee extract, and I will allow my clever scientific friends to guess how this trick was performed.

When it became apparent that the Boer War could not last much longer, I was approached by a City man, who wished me to go to The Hague and see the Boer officials. He said that I might offer them £100,000 if they would cease fighting and allow the gold mines to start up. It was known that the war could not last more than two or three months longer, but interested parties were able to pay handsomely if the gold mines could be started up at once. I first went to see Lord Salisbury on the subject. He was perfectly willing that I should go and make the offer, but did not believe that I would succeed. However, I went over, taking my wife with me, and together we called on the Boer officials. They listened to what I had to say, and finally Lady Maxim attempted to impress upon them the enormous extent and great wealth of the British Empire, saying that it would never do for such a powerful nation to acknowledge themselves beaten by such a small nation as the Boers, and that the war would inevitably have to go on until the British had subdued all opposition. They admitted that she had made out a very good case, but said that they " depended upon God to come to their assistance," whereupon Lady Maxim expressed it as her opinion that God would not interfere, and I ventured to remark that

Napoleon, who certainly ought to have known something about such matters, had said that God was always on the side of the strong battalions and the heavy artillery.

Our little scheme did not succeed. However, a few weeks later the Boers surrendered and the war was finished.

CHAPTER XXVI

THE fact that I had been made a Chevalier de la Légion d'Honneur for the work that I had done on electricity, and that I had made a gun with a single barrel that would load and fire itself over 600 times in a minute, seemed to make people believe that I might be able to do anything in the mechanical or scientific line, and I was asked if I could not train a large fortification or naval gun by electricity. I replied that I could, and when I had applied electricity to training a large gun at Sheerness, one of the officers in charge said that he believed he could shoot a sea-gull on the wing with a gun trained by my apparatus. The gun was provided with a shoulder-piece so arranged that no matter which way the shoulder-piece was pressed the gun would follow it.

Having accomplished this, I was asked by my fellow directors if it would be possible to make a flying-machine that would fly by dynamic energy without a gas-bag, how long would it take, and how much would it cost.

I replied that I could make the machine, which would require five years to complete and would cost £50,000. The first three years would be devoted to the development of a light and quick-running internal combustion engine,[1] and two years to making experiments and building the machine.

[1] Since that time the light internal combustion engine has been developed to a remarkable degree of perfection by the makers of motor-cars, especially racing cars. Many years ago scientific engineers said, "Give us an engine that will develop the power of a man and will not

Later on, two of my fellow directors and some other friends put up some money and asked me to go on with my experimental work, but unfortunately I had to devote practically all of my time to the gun company. I hired Baldwyn's Park, where there was a fine mansion, and erected a large building for holding the machine. I engaged two men who were supposed to be very clever mechanics from Bridgeport, Conn., and put them in charge of the work while I was away, but as I was out of the country eighteen months during the next two years, very little was done except to spend the money.

As there was no internal combustion engine at the time suitable for the work, and as I had no time to develop one, I decided to use a very light steam engine, and for this purpose I designed a boiler and engine that developed a great deal more power for their weight than had ever been done before.

But I was altogether too ambitious. Instead of starting out to build a machine about forty feet wide, the width that most of them have to-day, my machine was no less than 105 feet wide, and my engines had been literally carved out of hard steel. They were compound, non-condensing, and developed collectively 362 horse-power. Each engine had its own propeller, which was 17 feet 11 inches in diameter, and with a steam pressure of 320 lbs. to the square inch the two screws gave a thrust of over 2000 lbs.

When I hired the place, I had a verbal understanding with the landlords that I could cut down whatever trees happened to be in my way at a moderate price; but when I came to ask permission to do so, £200 per tree was de-

weigh more than a barn-yard fowl, and we will very soon give you a flying-machine." At the present time, however, engines are made that develop a full horse-power and weigh considerably less than a barn-yard fowl.

manded.[1] This, of course, was altogether out of the question, so I decided to try my machine on a railway track. I laid down a steel track of nine-feet gauge and provided my machine with very light steel wheels to run on this track. In the first experiments, before we had provided any safety apparatus, the machine lifted off the track and the wheels sank into the soft earth. I then provided it with some very heavy cast-iron wheels, the forward wheels weighing 450 lbs. each, and at less than forty miles an hour, without all the aeroplanes on, these also lifted off and sank into the earth. I next provided an upper track of 3 by 9 Georgia Pine. This track was 35 feet gauge, and of sufficient height to allow the machine to lift off the steel track before the wheels engaged the upper track.

In making the experiments with all the aeroplanes in position, I painted the small wheels that were to engage the underneath side of the upper track red. I could then always tell at what point the weight was lifted from the lower track, and when I stopped, these wheels were always spinning in the reverse direction to that which they would have taken had they been running on the ground. I also had a very well made dynagraph which made a diagram of the lift during the whole length of the 1800 feet track.

With full pressure of steam, the machine would lift off the track after running about 300 feet, and in order to stop I had a very elaborate apparatus at the end of the track, consisting of three ropes and windlasses provided with rotating fans.

A great many people came to see the machine, but free flight was impossible without a very much larger field for practice purposes. There could, however, be no doubt as

[1] After I left the premises these trees were given away to anyone who would cut them down and remove them.

THE FLYING MACHINE WITH THE SIDE WINGS REMOVED

to the lifting power ; it certainly lifted a great deal more than its own weight and the weight of three men on board.

Among the visitors was Mr. Kung, the Chinese Minister. The machine was tied up to a dynamometer, and when the screw thrust was about 1500 lbs., I signalled to let go, whereupon the machine bounded forward with such rapidity as to throw the little Chinaman off his feet.

Shortly after this H.R.H. the Prince of Wales, now King George V, came down in company with Sir Edmund Commerell, Admiral of the Fleet ; and this time we did not let go until there was a screw thrust of 2000 lbs. ; of course, the machine bounded forward with very great rapidity. Admiral Commerell became frightened, and said, " Slow up," but the Prince retorted, " Let her go for all she's worth," and I did. The Admiral was greatly frightened when he found that we were going at railway speed with the woods only 200 feet away, but the three strong ropes and the rotating windlasses very soon brought us to a state of rest.

During a good many of the experiments for visitors we did not have all the aeroplanes in position, but one of our directors wished to see them all on, and what would happen if the engines were run at full speed. On this occasion we did not let go until the dynamometer indicated over 2000 lbs. screw thrust, and I kept the boiler pressure up to 320 lbs. to the square inch. We had not run more than 250 feet when all the weight was lifted off the lower steel track and all four of the small wheels were running on the underneath side of the upper track. After running about 1000 feet the lifting effect became so great that the axle-tree of one of the wheels for keeping the machine down was doubled up. On the breaking of the axle-tree the lifting effect on the other side of the machine became so great that

the Georgia Pine plank was broken in two and raised in the air, and I found myself floating in the air with the feeling of being in a boat; but unfortunately, a piece of the broken plank struck one of the screws and smashed it. I instantly shut off steam and the machine came to a state of rest on the earth, the wheels cutting deeply into the ground and leaving no track, thus showing that they had settled down vertically and had not run along on the ground before settling.

This was the first time in the history of the world that a flying-machine actually lifted itself and a man into the air.

The machine was practically the same as the Farman machine except that it was larger and instead of having a light internal combustion engine had a steam engine, but the quantity of water consumed by my machine was so great that even if I had had a large field for experimental purposes I could only have remained in the air a short time. It takes a lot of water to run a non-condensing engine of 320 horse-power.

Shortly after this accident, I received notice from the landlords that the property had been sold to the London County Council for the purpose of erecting a very large imbecile asylum. It appears that I had prepared the ground, so that all that was necessary was to erect the buildings.

At Baldwyn's Park I had hired about forty acres, of which twelve acres was good grass land. The first year I was there my gardener asked me what I proposed to do with the grass. As he was an old gardener and had had charge of the place before I took it, I ordered him to cut and stack it as he had done before, and told him to hire his men. He did so, and when I came to pay the bills, I found that

the sum required to settle the beer bill alone would have been quite sufficient to pay Americans in the State of Maine for doing the job. I asked him why he had stacked the hay, instead of storing it inside of the numerous beer kegs. During the night some evil-minded persons set the stack on fire. Fortunately I had not gone to bed, so I rushed out, and with the hose very soon put out all the fire except that which was underneath the stack, and this I finally extinguished. The next day the stack was spread out over the ground and dried. It was the colour of chocolate all the way through, but people said it would do very well for bedding for my horses. Shortly after this, my coachman came to me and said, "Petuchoc has eaten up his bedding." He was a very beautiful little trotting stallion that I had purchased in St. Petersburg. After this, he never would eat any ordinary hay so long as he could get kippered hay, and eventually he ate up all that was left of the stack.

The next season, when the hay was ready for cutting, a young gentleman driving a tall horse attached to a high dogcart put in an appearance. He owned one of the adjoining farms. He said: "Mr. Maxim, I understand you had a lot of trouble with your hay last season; would you like to sell it this time?"

I replied that I would and asked him to make an offer. I think the sum he offered was £20, which I accepted at once. He took out his cheque book, wrote a cheque and handed it to me.

As we had had a wet season there was a very heavy crop of grass. It was worth a great deal more than he had paid for it, and I learned that the neighbours were talking about it, declaring that the American had been "done."

I said nothing, but in the spring of the next year the same splendid monument of humanity, the same tall horse,

and the same high dogcart appeared. Again he asked me what I would take for the hay, and again I replied, " Make me an offer."

" The same as last year," he said.

I accepted and he gave me a cheque. Had I demanded more it would have been acknowledging that I had been taken in the year before. This year the season was very dry and the rabbits very numerous. When they had eaten up everything they could find in the woods they came out into the fields and ate every green thing they could reach ; they even gnawed my railway sleepers. When the season for cutting arrived, the same gentleman appeared again with three men carrying scythes. I asked him what he was going to do with the scythes. He said he was going to cut the hay.

" But," I replied, " you do not want a scythe : you want sandpaper." As a matter of fact there was not a blade of grass on the premises.

It makes me think of the very wise saying of a celebrated Dutch poet : " You can't sometimes pretty much most always tell how things are going to turn out sometimes, ain't it ? "

CHAPTER XXVII

AT the present moment, it is very easy for me to see that I rather overdid it at Baldwyn's Park. I was too ambitious ; I should not have attempted to do so much at first. Instead of making such a large machine, I should have experimented with a much smaller one, and been sure of my practice ground before commencing experiments.[1]

However, large as my machine was, it would have worked perfectly with no change except the substitution of a petrol motor for the heavy steam engine—not that the engine was too heavy to prevent the machine lifting, but the quantity of water consumed was very great indeed. The late Mr. Cody, who was one of the most skilful men on kites and flying-machines that we have ever had in England, just before his unfortunate accident, said : " Sir Hiram, your machine was all right—the proportions were all right ; it was not too large, and I am going to make another one just like it, with no change except in the motor-power." He told me that my machine had all the features that have been found necessary since.

I had spent a large sum of money, not only my own, but also the money put up by some of my fellow directors in the gun company, and I was naturally looking about to see if I could not find a way of raising some more money

[1] It is interesting to note that the largest machines now being built are practically the same size that mine was, and the arrangement of the aeroplanes and the steering apparatus are the same.

without disposing of any of my securities. While wintering in the South of France, I thought out a plan. I would make a show apparatus to be called "Captive Flying Machines," and I believed that one or two of these machines would earn all the money that was necessary to enable me to complete my experiments and make a new machine with a petrol engine.

So when I returned to England, I told certain parties who were supposed to know something of the show business what my plans were, and they all seemed to believe that the apparatus which I had sketched out would take very well if erected at Earl's Court, the Crystal Palace, and Blackpool. We formed a little company, of which I was the Managing Director. I made the working drawings of the apparatus as quickly as possible, working about twelve or fourteen hours a day.

The name Captive Flying Machines was at first given to this apparatus, and in fact all of the boats were provided with aeroplanes so arranged that the passengers could manipulate them, and so cause the boats to ascend and descend as they flew around the circle. However, it was necessary to have the L.C.C. pass the apparatus before they would allow it to carry passengers, and unfortunately on the day of the private test there was a very strong wind blowing which caused one of the empty boats to soar so high that it looked dangerous, and they refused to pass it unless the aeroplanes were removed. When this was done it became simply a glorified merry-go-round. Of course the boat would not have mounted too high had it been loaded or had the aeroplane been set at a slight angle above the horizontal. Had the aeroplanes been allowed to remain, it would have been very interesting to passengers, and the machine would have been immensely popular.

The first machine was erected at Earl's Court, and on the opening day, after carrying passengers free for about two hours in the morning, the large sum of £325 10s. was taken. This was certainly very encouraging. The machine was very well patronized during the season, at the end of which we found that it had taken in nearly £8000. Had not a breakage occurred it would easily have taken in fully £8500. Its success was so phenomenal that my fellow directors and associates became extremely anxious to put up still larger machines at Blackpool, Southport, and the Crystal Palace, but there were many delays, especially on the Blackpool and Southport machines; in fact, they were so late in commencing that work had to be carried on day and night, or at least was supposed to be. A friend of mine living at Southport, knowing that our men were working at night, visited the site of the machine at two o'clock one morning, at which time a large number of men were supposed to be at work. The highly paid man in charge was nowhere to be found, and all his men were sleeping peacefully on the sands. The cost of erecting these two machines was beyond all reason; they should have cost about £3000 each, instead of which they cost about £7000 each.

The very large and fine machine at the Crystal Palace was erected at the expense of the parent company in London. This was a very expensive machine, and its erection made it necessary for the company to issue £4000 in debentures, all of which were taken by myself.

Although all of these machines were very successful at first, I was not completely satisfied. I found that the Water Chute was very popular, and that the patronage was constant year after year. I therefore determined to bring out a new machine which would combine the excite-

ment of both the Captive Flying Machine and the Water Chute. The machine on starting would have a vertical shaft, but when the boats were well in flight the shaft was to be inclined so that on one side of the circle they would strike the surface of the water and then ascend very high on the other side. This would make an ideal apparatus. It appeared to me that this new machine would be vastly more attractive than the type that we were making, and, with the approval of my fellow directors, I hired two able draughtsmen to prepare the working drawings; we already had a highly paid engineer in charge.

In the late autumn, after the Earl's Court machine had ceased running, I commenced to get out the plans for the new machines. The weather being very cold and damp I had a sharp attack of bronchitis.[1] The doctor put me to bed, and told me that I certainly must not go out for some weeks. Shortly after this, our highly paid engineer came to see me. He said it was impossible for the draughtsmen to keep warm; the large room where they were working was very cold and damp, and the men were actually attempting to work with their overcoats on, some even with thick gloves on. He said he had done all he could with the heating apparatus which I had designed, but it did not warm the place at all. I told him to go and see if the pipes were not stopped up. Shortly after he returned and said that the pipes were not stopped up, and that they had a red-hot fire, but there was not the least manifestation of heat in the draughtsmen's room. He asked permission to buy some kerosene oil stoves, one for each man, and I consented. About two weeks later, when the doctor allowed me to go out, having a great curiosity to see why it was that the

[1] At that time I had not invented my apparatus for the treatment of bronchitis, a description of which will be found in the next chapter.

apparatus which I had designed and put up for heating this room had failed, I visited the building; and, very much to my surprise, I found that, notwithstanding that I had these three highly paid men in the room, they had never started a fire in the furnace for heating the room at all; they had trusted everything to a labouring man, who had made a rousing fire in the big stove in the engine-room. I at once ordered a fire to be built in the proper furnace, and as soon as it was under way the draughtsmen's room became so hot that it was necessary to open the windows. I mention these facts to show the unaccountable stupidity of the kind of men that we have to deal with—men who have their minds on anything except their work.

Although the sum of money taken at Earl's Court was very large, it would have been still larger if it had not been for an accident; and this again shows the unimaginable stupidity of the men upon whom we have to rely.

At Earl's Court the machine was driven by a large gas engine, having a very heavy fly-wheel. Of course when this fly-wheel was in rapid rotation it had stored in it an immense amount of energy. When the machine was at rest, with 100 passengers or so in the boats, it was impossible to set this mass in motion in a few seconds, so there was interposed between the motive power and the captive flying-machines the best friction clutch that I could purchase. But friction clutches often go wrong—sometimes the metal seizes so that all the parts rotate together. To guard against this, I had what is known as a jockey pulley placed on the big belt that drove the machine; if the strain was too great, the jockey pulley was raised into a position where the belt would become very loose and slip. In this way it was impossible to put an undue strain on the machinery; even if the friction clutch should go wrong—

and it did occasionally fail to operate properly—the belt would slip and prevent any damage being done.

But the man in charge was a Scotchman. He often told me that he had been a millwright for many years, and that the jockey pulley was on the wrong side of the belt; instead of being on the tight side of the belt it ought to have been on the loose side, so as to keep the belt from slipping. I attempted to explain to him that it was necessary that the belt should slip, otherwise the machinery would be broken, and that it would be impossible to set such a large rotating mass in motion at once; but these were nice points that he did not understand. He was a "*practical*" man, while I was a *visionary* scientist; so one night, finding that his friction clutch did not work well, and that the belt slipped, as I intended it should do, he purchased a quantity of very sticky material, that was advertised to prevent belts slipping. He applied some of this, and while he had about a hundred passengers in the machine, his friction clutch failed to work, whereupon, as the belt could not slip, the bevel gears of the machine were broken, which of course not only cost a lot in repairs, but prevented the machine from earning money at the very height of the season.

At the end of the first season, when the machine at Earl's Court ceased to bring in the golden sovereigns, one of our shareholders, who had been a showman himself, thought out a new plan of bringing money into the company's coffers. He claimed to have discovered that there was an error in the agreement by which I had assigned the patents to the company. In the first instance I had written out a very simple agreement in plain English, which was really quite sufficient, but the company wanted one that was drawn up by a solicitor, and this I agreed to.

It seems that the solicitor had used certain phrases which were not very easily understood, and these were said to be "ultra vires," whatever that means. The man who had made the discovery got some of the other shareholders and directors to join him, and they believed that they had a good chance of getting £15,000 out of me as damages.[1] They submitted the agreement to learned counsel, and he assured them that the case was very clear, and that they had every chance of getting my money. I then submitted all of the papers to learned counsel of a still higher type, and was assured that the agreement was quite in order, and that my position was perfectly safe. In the meantime the opposition obtained very high class counsel to conduct their case, and I retained Sir Rufus Isaacs, who at that time was the most eminent lawyer in England, and is now Lord Chief Justice.

However, I saw that the lawsuit was bound to be very expensive, and that there was not the least chance of my recovering anything, even if I won my case; it would be like "suing a beggar and catching a louse." Moreover, I had the best of reasons for not wishing to have anything to do with law or lawyers, so I approached one of the men whom I thought might be the best disposed of the lot, and had never been a showman. I laid the whole matter before him, and said: "If there is any fault in the agreement there is no reason under heaven why it cannot be changed. Why not have a new agreement drawn up that we can all understand and that everyone will approve

[1] As far as I can understand the question the company had given me £15,000 in shares for the patents, and as there was something in the agreement that was supposed to be faulty relating to the transfer of the patents, they did not ask for the return of the shares but that I should pay cash for them. I admit, however, that I never did quite understand what all the row was about.

of? I certainly have not made any money out of the company, and I am perfectly willing that the company shall have the patents."

I went still further, and said that I would pay all the legal expenses that they had been put to, in order to settle the matter up and keep it out of court; and this was agreed to by everybody. I thought these legal expenses would be somewhere about £100 or £150, but they discovered a way of making them much greater. I think there were about five lawyers representing five different individuals, and each one would make a slight change in the new agreement, and send it on to the next one. He would read it, alter it, and send it on to the next, and so on, until it finally arrived to the solicitor of the company. As a rule he would disagree with all the alterations that had been made, make some change himself, and again send it round the circle. I think it took the paper about two weeks to complete the circle and get back. Then, finding it all wrong, he would doctor it up again and send it on another excursion. They kept this up for several months until the legal expenses all round amounted to considerably more than £1000.[1] I paid up and washed my hands of the whole concern, resolving never again to have anything to do with anyone connected with the show business.

When the money had been paid it was getting about time to start up the machines again, and then the very man who had caused all the trouble came to me and implored me to resume the Managing Directorship, because they were satisfied that if the business were properly managed it would bring in a lot of money. He told me

[1] This account appeared to me to be phenomenally large, so I took it to the tax master and argued my own case, with the result that it was cut down by about one-half.

that they were of the opinion that I could do much better with the machines than anyone else.

In reply I said: "I am the largest shareholder in the company. In the first instance I furnished more money than all of the others put together. I hold all of the debentures, for which I paid £4000 in cash, and I will agree to take charge under the following conditions. You will refund to me all the money that I have paid out in legal expenses and all the money that I have paid to the various lawyers in the battledore and shuttlecock game that they have played with the new agreement, and will give me some security for the £4000 that I have lent the company." Of course he said this was altogether too much, so I abandoned the whole thing, lost my patents and all the money that I had put into the enterprise, and never received a single brass farthing for the work that I had done.[1]

But this is not at all exceptional in the show business. Showmen the world over are said to be very much like brigands, as will be seen by the following. A few days after the first machine was started at Earl's Court the newspapers referred to it as "the clou" of the exhibition, "the greatest attraction at Earl's Court," adding that it was "well patronized" and the "receipts were very large." This, of course, excited the envy of certain showmen who were not any too prosperous, and one day a professional showman of the brigand class came to me and sought an interview. He said he had observed the very great success of our machine at Earl's Court, and had a very important proposition to make to the company. I told him it would be necessary for him to see the other directors. Accordingly

[1] My losses on this enterprise amounted to a little over £10,400, and nobody made any money out of it except the lawyers and one of the promoters.

at the next meeting the showman was called into the board-room, and as he took a seat at the table I said : " You have written to us of the phenomenal success of our machine ; you say that you are an old showman, and that you have some very valuable information and suggestions to give us. Now will you kindly tell us in what way you can serve us—what good can you do for us, and how do you propose to increase our receipts ? "

The reply was rather astonishing. " I do not claim that I can increase your receipts. You are practically carrying all the passengers that your boats will hold. I do not know that I can do you any good in the business, but I am quite able to do you a lot of harm."

He then demanded that he should have three thousand fully paid up shares delivered to him, and that he should have a seat on the board !

This was certainly a very remarkable demand, and we declined to have anything whatsoever to do with him. He then commenced his campaign of doing us all the harm in his power. His tactics were peculiar. The arrangement that we had made with the Southport Company was that a certain amount of shares and cash should be paid over to us as soon as the patents which I had applied for were completed, that is, granted. This fellow, having learned of the agreement, decided to profit by it. If we would not give him the shares and a seat on the board he would prevent us getting our patent, which he set about to do. He claimed that he had already patented a similar apparatus, and prayed the Controller of Patents not to grant ours. On examining his so-called patent we found that it was a totally different apparatus, and when the day for the hearing arrived he petitioned the Controller to have another date fixed, as " he was not quite ready." This trick he repeated

three times. In the end I wrote to the Controller, telling him exactly what had happened, and prayed that he should call an early hearing and allow no further delays. It then became necessary for this unscrupulous showman to put in an appearance. When he had shown his patent and told his story, the Controller asked him if that was all he had to depend upon. He admitted that it was, whereupon the Controller decided that my application had nothing whatsoever to do with the old patent referred to.

But this individual was not the only hungry one that we had to deal with.

According to the agreement that we had with the Lancashire Company, as I have already explained, we were to receive a certain number of shares and cash, but somehow or other both the shares and cash managed to go astray.

The readiness with which I parted with my money in order to disentangle myself with the very objectionable characters connected with the Captive Flying Machine seemed to excite the greed of certain other parties who imagined that all they had to do was to threaten a lawsuit, when I would part with any amount of money demanded. A certain individual who was something of a showman had made an arrangement with the company that if he sold machines he was to receive a commission of 5 per cent, but he did not sell any machines. However, he came to me one day after the winding up of the company, and said that he had spent £300 in attempting to sell the machines, and demanded that the money should be refunded. I knew very well that he had not spent three hundred shillings, and that his pay depended altogether upon results. However, he became very much excited, and demanded his money, and a few days later a solicitor's

clerk called on me to serve some papers connected with the threatened suit, and asked me for the name and address of my solicitor. On looking over the papers I told the man that it appeared to me that it was more of a case for Scotland Yard than for my solicitor. In the meantime I wrote to the showman, putting to him the following questions: "Will you be good enough to tell me who hired you? When were you hired? Where did you work? What did you do? What pay were you to receive? How long did you work?" A few days later I received another paper from the lawyers. They were bringing a further suit against me for defamation of character, claiming heavy damages. The gravamen of my offence was that I had said to the solicitor's clerk that it was evidently "a case for Scotland Yard." On this occasion I decided to fight, and I am very glad that I did, because it gave me an insight into the proceedings in the Law Courts.

The case came up before the High Court of the King's Bench and before a very eminent judge. The plaintiff having been placed in the box, his counsel commenced proceedings by reading my letter.

"Here is a poor man," he said, "who had been working for Sir Hiram Maxim for many months without receiving a single penny of his salary, and when he asks for his pay he receives a letter like this."

The plaintiff had not gone on very far with his testimony when His Lordship scrutinized him very sharply; he was a miserable-looking fellow. His Lordship cautioned him to be careful of what he said, and shortly after asked if there was not a written agreement; this was produced, and after examining it, the judge said: "This case should have been brought against the company, not against Sir Hiram Maxim." Then, turning upon the counsel for the

plaintiff, he said: "You had no business to bring a case of this kind into court—I will not have it." The two cases were then withdrawn, the judge remarking that he was very pleased that this step had been taken, as it might have developed into something very disagreeable for the plaintiff.

No better example of the dishonesty of lawyers can be given than the following, which I encountered after leaving the States. Dishonesty among lawyers has no geographical boundary.

The laws, having been made by the people for the people, are, as a rule, wise and just; it is only the lawyers that are all wrong. There are vastly more lawyers than we have any use for—too many striving to make a living out of other people's troubles—and it is therefore to their advantage when they get a case to make as much out of it as possible, which means that instead of getting their client out of trouble and saving his money, they greatly prolong the agony and relieve him of as much money as possible.

When I came to Europe I owned seven new houses in Philadelphia, and a certain well-known business man owed me 15,000 dollars. Being a non-resident property owner, and living in a foreign country, I was, of course, a fair target to be shot at by the enterprising blackmailing fraternity. The man that had charge of my houses was a builder, and he always managed somehow or other to absorb all of the rents in paying taxes and executing imaginary repairs. I learned that he was practically living off my property, and as I received absolutely nothing, I put the property in the hands of a reliable estate agent, after which I received my rents all right. I proceeded against the man who owed me the 15,000 dollars and forced him to pay up, and it appears that the builder whom I had discharged imagined that he might annex this money.

At any rate, he threatened that unless I gave him fifteen thousand dollars he would cause legal proceedings to be commenced against me that would cause a very great scandal. I replied that I would not give fifteen cents. He was as good as his word, however, and did cause some very serious charges to be brought against me, some account of which appeared in the newspapers. It seems that the party he was exploiting was being exploited by another man on another case at the same time. However, the case was very soon decided in my favour, and my lawyer was careful to see that the records were properly filed away in the court-house, assuring me that the same party could not be exploited against me again. My money was sent to England, and, to prevent any further trouble, I sold my property in Philadelphia.

Eighteen years later a gentleman off the same piece, wishing to annex some of my property, and knowing that the Philadelphia authorities were very lax in the care of their court records, went to Philadelphia, abstracted the papers, and attempted to work the same case over again in New York. He even went to the extent of bragging that he had "attended to the Philadelphia papers," and that they would not be "available" for my defence. Again I refused to be bled, and again proceedings were commenced against me. I found, however, that the Philadelphia lawyers had certified copies of the court records, and when I had obtained these, I knew to a dead certainty that the case would be thrown out of court. At the preliminary hearing the New York lawyer whom I had hastily picked up refused absolutely to produce the papers, and although I insisted strongly, nothing that I could say or do would induce him to do so. A few days later I received a letter from the company's patent lawyer, an honest and straight-

forward man. When I went to his office he told me that the evening before at the Lawyers' Club he had heard two lawyers talking, and as my name was mentioned he had listened. One of them was very jubilant, and said to the other : " I have a very fat case on now ; it will last at least three years, and my fees alone will amount to fully one hundred thousand dollars." As this was my lawyer, I saw at once the reason why he had refused to produce the papers, so I produced them myself, and the case was finished.

When the company's lawyer informed my lawyer that the jig was up and paid his bill, which was a very stiff one for the little he had done, or rather failed to do, he was perfectly flabbergasted ; the quarry had escaped from his net.

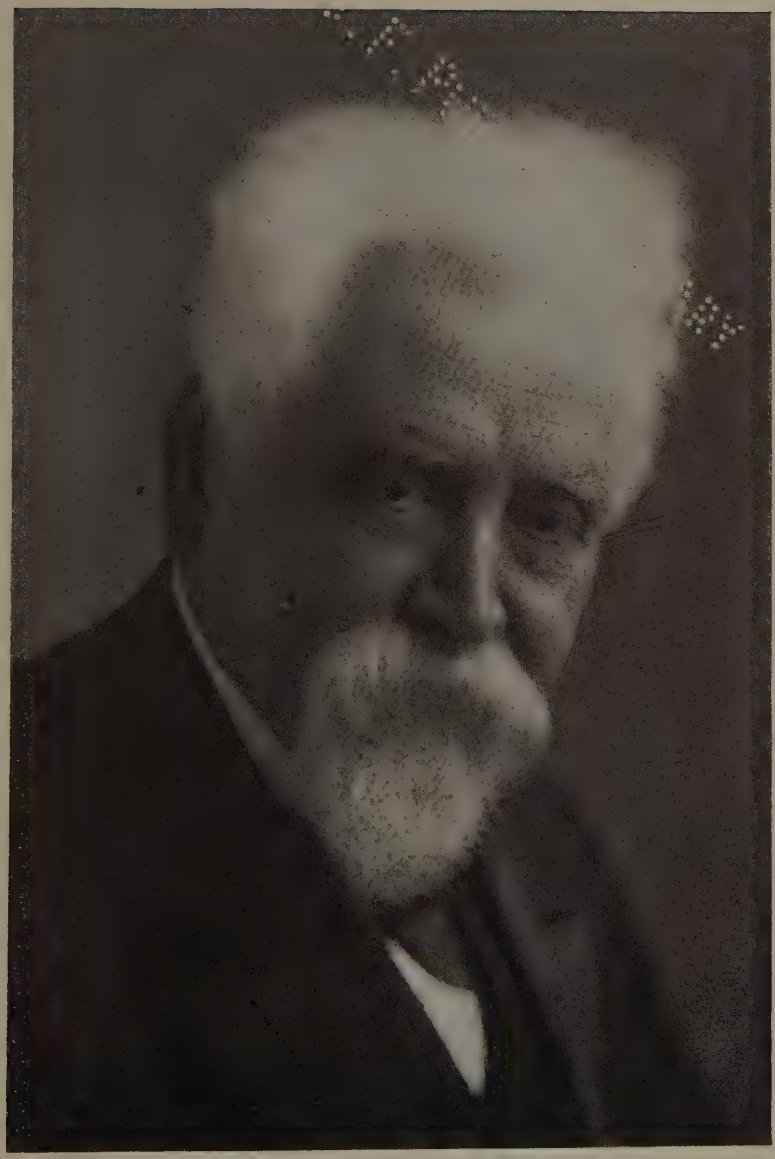
Now a most extraordinary thing happened. The individual who had been exploited in the two cases made a very full and complete confession and swore to it. The exploiter then became frightened lest criminal charges might be brought against him, and he had to pay his hired accomplice to go into hiding and remain in hiding until I had left the country.

Before leaving New York for England a very old friend advised me to place a considerable sum of money with his son, who he said was a very clever and perfectly honest young lawyer, the object being that if there were any new developments in the blackmailing business, he would be in a position to proceed against the parties. If nothing occurred he was to return the money to me. After about two years, when I asked for the return of the money, he sent in his bill, which amounted to the whole sum and three hundred dollars besides. I then employed Lady Maxim's Boston lawyer to proceed against this lawyer. The result was that he paid up in various small instalments, after

the manner in which poor people purchase furniture. No, I did not have to sue Lady Maxim's lawyer in order to get my money!

I have often been asked by Americans and others why I became naturalized; why I became a British subject. All of my ancestors were English, and while I had charge of manufacturing establishments in the States I preferred English and Scotch workmen to all other foreigners, and I always advised them to become naturalized, so as to be able to vote and neutralize the influence of the disreputable party. I told them it was their duty to do so, and as a rule they followed my instructions. At that time the city government of New York was unspeakably corrupt.

The reception that I received in England and the straightforward honesty of the gentlemen with whom I had to deal, gave me a very favourable opinion of the English character, and it occurred to me, especially after I had met the then Prince of Wales and other members of the Royal Family many times, that I ought to become a British subject so as to be able to vote, especially so as I was permanently settled in England. I had already been knighted and decorated in other countries, and shortly after becoming naturalized I was knighted by Her Majesty Queen Victoria, but received the accolade from King Edward, and shortly after this a strong attempt was made to induce me to contest a seat in Parliament, but I declined on account of my deafness.



THE AUTHOR AT THE PRESENT DAY

CHAPTER XXVIII

THIS is indeed a very curious world. I was the first man in the world to make an automatic gun. The first gun that I made in London had but one barrel, and loaded and fired itself six hundred and sixty-six times in one minute by energy derived from the recoil. The gun was very light, small, and effective, and the automatic system, which was thoroughly worked out by myself, went into universal use throughout the whole civilized world. It is astonishing to note how quickly this invention put me on the very pinnacle of fame. Had it been anything else but a killing machine very little would have been said of it. The following will show how I sacrificed all this fame by inventing a life-saving apparatus.

I think it was about the year 1900 that I had a very severe attack of bronchitis. First, we had the family physician; then he called in two experts on throat troubles; but they did me no good. They recommended, however, that I should go to Bournemouth and put myself under the treatment of a noted specialist. It was a failure. I returned to London and consulted the greatest specialist on throat troubles in England, and a few days later he sent me about half a ton of stoneware bottles containing mineral water. I took some of the water and followed the treatment for a time without the least effect. I was then recommended to go to Mont Dore, where they have strong and hot mineral springs and there are many doctors who make a speciality of treating

bronchitis. I submitted to a very long system of steaming and boiling and taking the waters with no effect. I next learned that at Royat, not far distant, there was an English physician who was supposed to be the greatest expert on throat troubles in France. After he had been working on me about three weeks he said: "There remains only one thing for you to do, and that is to go to Nice and go through a system of treatment at Vos' Inhalatorium."

I spent the next winter at Nice and was much gratified to find that I was greatly benefited by the treatment. It was very long and very severe. Every day I had to inhale an hour at a time; but the bronchitis had disappeared completely by the beginning of April, when I returned to England. However, with the cold and foggy weather of the next autumn the trouble returned as bad as ever; so again I went to Nice and went under the treatment. While there I heard a great deal of discussion regarding throat troubles—generally in the French language. Mr. Vos became very much interested in my case, perhaps more so on account of the comic sketches that I made for him, some of which greatly amused the Russian Grand Dukes who were his patients. At any rate I made a point of learning all that could be learned about the treatment of bronchitis before I left Nice, and the next season, when the trouble commenced again, I bought some glass tubing and made a few glass inhalers myself. By making a mouthpiece of such a shape that the vapours were introduced directly into the throat instead of medicating the inside of the mouth I found that my simple device was much more effective than the very elaborate machinery of Mr. Vos.

When I became fully satisfied that my apparatus would ward off bronchitis, I gave a few away, and they all did very well indeed. The next move was to get two hundred of

them made by a glass-blower, and these I also gave away, with splendid results. This created a demand, and I placed the sale of the instruments with the eminent firm of John Morgan Richards and Sons, of London, since which time hundreds of thousands have been sold and have given entire satisfaction.

A short time ago, while returning from the seaside, I found myself in a first-class compartment with a distinguished-looking gentleman. He asked me if I were not Sir Hiram Maxim, and upon telling him that I was he gave me his own name, which I recognized as being one of the most eminent of the Harley Street physicians.

He said: "I have tried your inhaling apparatus with very good results; it is a splendid thing; I recommend it to all my patients who have throat troubles. You have prevented an immense amount of suffering in the world and you ought to be very proud of it."

This is the way that one of the greatest physicians in the world looked at the subject, but some of my friends not altogether unconnected with the gun business have told me that I have ruined my reputation absolutely by making a medical inhaler, and a scientific friend has written me deploring the fact that one so eminent in science as myself should descend to "prostituting my talents on quack nostrums." However, this little inhaler enables me to live all winter in England and large numbers are now being sold all over the world. So I think I shall be able to withstand the disgrace of having brought out such an invention.

From the foregoing it will be seen that it is a very creditable thing to invent a killing machine, and nothing less than a disgrace to invent an apparatus to prevent human suffering.

It is a curious and interesting fact that one of the gentle-

men who has ridiculed me the most recommends these inhalers to his friends and always takes one with him when travelling.

While at Nice I learned that the inhalants could be taken very much stronger if a small quantity of cocaine were used, but as cocaine was regarded as a poison, it was not expedient to use it. I spent my boyhood in the State of Maine, where there is a little plant which, although it is used for flavouring confectionery, really benumbs the mouth and throat just as cocaine does, only in a less degree. By mixing a small quantity of the oil of this plant with pine essence, the vapours may be inhaled very strong without producing coughing, and this little discovery is one of the things that has made the inhalers such a remarkable success.

I suppose I shall have to stand the disgrace which is said to be sufficiently great to wipe out all the credit that I might have had for inventing killing machines.

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